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ARCHITECTVRE

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DECORATION

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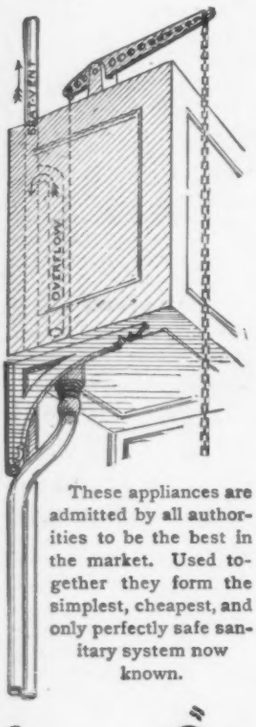

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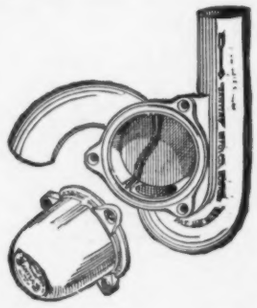

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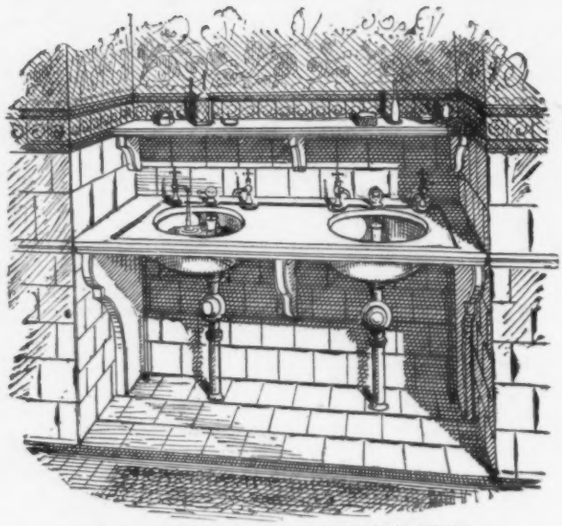

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A CURIOUS application of the methods of the Knights of Labor has been made in Pennsylvania within a few days. It seems that the officers of one of the most important railroads in the State discovered, not long ago, that the road was being systematically robbed by the employés, who broke open or unlocked freight cars in the night, and carried off thousands of dollars' worth of property at a time. On setting detectives at work to discover the perpetrators of these thefts, it was ascertained that there were hundreds of persons concerned; and the railway officials, learning that the arrest of all those against whom proof had been found would leave them without conductors and brakemen enough to run their trains, contented themselves with making a beginning by arresting about a hundred of those who could be most easily spared or replaced. No doubt they would have gone on to bring the others to justice, but for a rather startling move on the part of the brakemen and conductors still out of jail, who held a secret meeting, as the result of which they informed the officers of the road that unless a guaranty was immediately given that no more arrests should be made, and a certificate issued to the effect that all the employés of the road still at large were innocent of crime, a strike would be ordered, and the trains in movement on the line would be at a given signal switched off on side tracks and abandoned, leaving the passengers in them to their fate. As this course would bring loss and suffering to thousands of helpless passengers, besides enormous expense to the company in the way of damages, the conspirators undoubtedly foresaw that the directors would think twice before rejecting their proposition, even if they did not conclude to accept it. As a matter of right and wrong, there seems to be no reason why such a scheme on the part of a gang of known or suspected thieves, who happen to be in a position to distress other people, for keeping themselves out of prison by threats of wholesale vengeance on those in their power, is any worse than the regular proceedings of the Knights of Labor for monopolizing the means of living; but the probability that a large part of the travelling public, as well as of the business men of the country, may be affected, instead of a few poor mechanics, lends the matter a special interest. So far as the community is concerned, the attempt to use its distress to coerce a party to a quarrel in which it has no part is simply highway robbery, and should be punished accordingly. As every one knows, a crew of sailors who should take possession of a ship, and hold it until they had exacted from the captain compliance with some demand, would be hung as pirates at the first port at which they touched afterward; and the land pirates who presume to seize upon the channels of public communication for their own purposes should be dealt with in a similar manner. Many years ago, when governors and expectant governors scorned to dance at the heels of "colossal organizations," the employés of a New-York railroad undertook to prevent the running of trains until some demand of theirs should be granted. The moment the news of this invasion of public rights was received, Governor Hoffman, a man as popular as he was able and courageous, took military possession of the road, and trains, guarded by bayonets, were run on schedule time until the Governor thought it safe to hand back the road to the directors of the company.

MR. JOHN WANAMAKER, of Philadelphia, has recently announced that henceforth the persons employed in his store, some thirty-five hundred in number, will participate in the profits of the business, under a rule which provides that every one who has been in his service for seven years or more shall receive each year a dividend proportionate to the value of his or her services during the preceding twelve months. This value is to be reckoned, not alone by the amount of salary paid, as is usually done in such cases, but by the faithfulness and industry of each, as shown by the records of sales credited to the different employés, or other work done. Mr. Wanamaker himself proposes to be the judge of the merit of each person, but this is almost a matter of course, and the introduction of an element of emulation among the employés, by which those placed by circumstances in a humble position may be sure that faithful service in that position will be recognized and rewarded, is certainly of great importance. The total amount to be taken from the profits and divided annually will be not less than one hundred thousand dollars, all of which is to be taken from Mr. Wanamaker's private share of the receipts of the firm's business. Supposing that half the employés are entitled to participate in this the first year, the dividend will average nearly sixty dollars for each, a very pretty reward of merit, particularly when accompanied with a prospect of its annual repetition. Participation schemes of this kind are getting to be so common that this is only particularly remarkable for the great number of persons to be benefited by it, and perhaps also for being one of the first applications of the principle to a large retail business; but its announcement in Pennsylvania, the home of the head of the "colossal organization" of the Knights of Labor, leads one to reflect that the future may have trouble in store for the Wanamaker clerks and shop-girls. According to Mr. Powderly, it is "a great gain" to prevent money from getting into the pocket of an employer of labor, by any means, fair or foul, whether any of the money kept out of his pocket goes into that of other persons or not, and as a good deal of money annually goes into Mr. Wanamaker's pocket, it would evidently be a highly meritorious act, according to this view, to "boycott" his store, or scare his customers away with dynamite, or in some other way reduce the profits of his business to those of one managed by a lazy blackleg. Under the new arrangement there would be a difficulty in the carrying-out of a plan of this kind for elevating labor at the expense of monopoly, owing to the fact that the cutting down of Mr. Wanamaker's income would also cut down that of several hundred poor people who shared in his profits. It is true that a poor person who does not belong to the "colossal organization" is quite as legitimate a victim of its schemes as a monopolist, and usually a much less troublesome one, but two or three thousand people attacked at once, even by a "colossal organization," would be likely, before they succumbed, to make outcry enough to attract the attention of the community; and although the Knights of Labor, as we are told, "will not stand much nonsense," the rest of the world, it may some time be found, will not stand much more tyrannizing by self-constituted organizations over poor and helpless people who ask nothing more than the privilege of being allowed to work for their living.

FIRE AND WATER has for some time expressed doubts as to the value of the indiscriminate use of automatic sprinklers, which are just now quite popular with real-estate owners. As it says, with its usual good sense, while sprinklers in factories are an invaluable protection, acting instantly, where nothing but immediate action is of much avail, and rarely doing any incidental harm beyond the wetting of a few pieces of goods, the same sprinklers in a city store, if brought into action by a fire which the watchman could, in such a place, easily extinguish, might destroy many thousands of dollars' worth of property in a few seconds. It is rather remarkable that a few days after its noticeable editorial on the subject appeared, its wisdom was illustrated by the occurrence of a fire, in which almost the only damage done was by the sprinklers, which ruined more than thirty thousand dollars' worth of goods before the people who came to extinguish the slight fire which

set them in operation could get the water turned off; and the more intelligent insurance men are beginning to doubt whether they should be recommended without discretion. Some of the most recent sprinklers, to avoid the objection to those acting automatically, are arranged on the "dry-pipe" plan, by which the raising of the temperature in a given room sounds an alarm, either outside or inside the building, in some place where sets of valves are provided, under the care of a watchman, by which water can be let into the sprinklers of any room. This method has yet to be proved. Under cool management, and with close attention, the control of the valves must be valuable; but an inattentive, or, still worse, a panicky watchman, might do more harm with them than could be accomplished under the most defective of the old sprinkler systems.

THE Monthyon prize for improvement in mechanical arts which involve unwholesome conditions for the workmen, has this year been awarded to MM. Appert, glass-workers at Clichy, for the successful substitution of compressed air for the effort of the lungs in glass-blowing. Until the present time nearly every article of glass, excepting plate-glass and a few objects pressed in moulds, is fashioned into form by the workman's breath. With small pieces the blowing is not a difficult matter, but with large ones, such as the huge cylinders which, split while hot by the touch of an iron bar, unfold into sheets of window-glass five or six feet long, a very violent and sustained effort is necessary, which is within the power only of the strongest men, and even in them often produces serious injury. Various devices are already in use for helping the work, such, for instance, as the dropping of alcohol through the blowing-tubes into the hot sheet-glass cylinders, to assist by its vaporization and expansion the effect of the breath; or the little air-pump, which, invented by an old workman to supplement his failing powers, now finds a place in every manufactory; but the general substitution of air under mechanical pressure for the breath expelled from the lungs by muscular effort had never been successfully made before MM. Appert solved the problem. The principle having been long understood, the merit of the new appliance consists mainly in the details by which, from a reservoir of air, compressed by a powerful pump, portions can be taken at any desired pressure and transmitted to the melted glass through a tube which the workman can swing around his head, roll on a slab, or twist or turn in any desired direction, with a freedom as great as that with which he twirls a tube after applying it to his mouth. The valves for supplying air to the blow-pipe are set in the floor, so that the workman can operate them with his foot; and, according to the *Revue Industrielle*, the advantages which the process offers are so great that, notwithstanding the ignorant opposition of workmen, several large establishments have already followed MM. Appert in adopting it.

IT is well worth while for architects to remember that the art of decorative mosaic, particularly in its application to church buildings, has recently received a considerable impulse by the opening of an establishment in Venice, where particular attention is to be paid to the simplification of processes, in such a way as to bring the cost of the work within the means of small churches and private persons. The idea of founding such an establishment seems to have been suggested by a resolution of the Catholic Congress of Modena in 1879, which expressed the wish that such a splendid and unalterable form of decoration might be made more generally available by lowering its price and extending its use; and the charitable ingenuity of two Venetian ladies, who were anxious to find occupation for some highly-trained young girls in whom they were interested, furnished another factor in the enterprise. With the help of Dr. Saccardo, the director of the mosaic workshop connected with the church of Saint Mark, and of Professor Raffaelle Cattaneo, the architect of the great monument to Pope Pius Ninth, at Rome, and under the special encouragement of the present Pope and the Cardinal of Venice, a small corps of skilled workmen was engaged, the ladies Silvestri furnished a building, the ancient Palazzo Sceriman, near the church of Santi Apostoli, of which they were the owners, together with the coöperation of their protegés, and the enterprise was fairly launched. The first important commission with which the new establishment was entrusted was the mosaic work for the monument of Pius Ninth, but other orders came in, and twenty young ladies are now constantly employed in designing all kinds of mosaic, from the decoration of a lamp to that of a church dome, which is executed by a proportionate number of workmen. Although church decoration is the most important part of the business, domestic decoration, in any sort of mosaic, is undertaken. The work is sent to any distance, made up into sections of convenient size; and those who wish for anything of the kind may, as we are assured on the best authority, have it well and cheaply done, and at the same time do a kindness to poor young girls, by applying or writing directly to Madame Elena Silvestri, Sceriman Palace, Santi Apostoli, Venice.

AN odd and rather startling form of draw bridge is described and illustrated in *Le Génie Civil* of a recent date. Between the important maritime town of Saint-Malo and the suburb of Saint-Servan is a channel, which forms part of the port, so that it is not allowable to interrupt it by a bridge, and even a draw-bridge of the ordinary type would be very much in the way. Ferry-boats would not obstruct navigation; but no one likes ferry-boat sailing if he can reach his destination in any other way, and an architect of Saint-Servan, M. Leroyer, devised a combination, as we may say, of ferry-boat and bridge, uniting the advantages of both. The tide rises to a great height at Saint-Malo, the difference between high and low water being often as much as thirty or forty feet, and at low tide a track was laid across the bed of the channel, resting on sleepers sunk in the mud. A platform was then constructed, resting on a trestle-work about forty feet high, the foot of which was furnished with wheels, rolling on the track at the bottom of the channel. Ropes were laid along the bottom, attached to the rolling platform, and running over pulleys at each shore-end. Piers were then built, after the fashion of ferry-slips, so as to embrace the platform at each end of its trip, and hold it firmly, and the platform-ferry was ready for service. A small awning is spread over the central portion of the platform, and those who sit there pay an extra price, ordinary passengers paying only one cent, but being exposed to the weather. The platform will accommodate rather more than one hundred passengers, and carriages and cattle can be transported on occasion. When all is ready, the platform launches forth, drawn by a windlass acting on the ropes, and in ninety seconds is at the opposite shore. Although there are no guides or other means of steering the apparatus except the ropes at the bottom, and it has a very top-heavy appearance, it is found to move with perfect steadiness and precision either at high or low tide, although the current runs at half-tide at the rate of more than six miles an hour; and even in weather when vessels dared not leave their anchorage, no inconvenience has been experienced by the bridge-passengers, nor has any accident of any sort occurred during the sixteen years that the bridge has been in use.

THE *Revue Industrielle* gives a very curious account of some experiments recently made at Pantin, near Paris, by M. Charles Weyher, one of the directors of a mechanical laboratory there. A jet of air or steam was directed at an angle of forty-five degrees with the horizon, and two light spheres, one of cork and the other of India-rubber inflated with air, were thrown into it. Both the spheres, although heavier than air, were kept suspended in space by the jet, which at the same time communicated to them a rotary motion. The rotary motion, it was found, was only indirectly concerned in keeping the spheres suspended, the effect being mainly caused by the little whirlwinds, a series of which was set in motion by the jet. On placing the hand in the jet, beyond the spheres, the course of the little whirlwinds was disturbed, and the spheres approached nearer to the nozzle, from which the jet issued. If the lighter sphere, that filled with air, was placed originally farther from the nozzle than the other, it would retain that relative position; but placing the hand in the jet beyond, it would cause it to approach more nearly to the other. In a second experiment, a globe formed of overlapping strips was mounted on a spindle in the line of the jet. The current appeared to be absorbed by the hollow globe, and given out again at its equator, where a centrifugal current was felt, so strong as to throw bits of paper presented to it forcibly away. Nevertheless, this centrifugal current had a definite orbital form, as it seemed, for when a light inflated globe was placed near, it was at first repelled, and then attracted, finally taking up a motion of rotation about the primary globe, in the plane of its equator, and if a disk of paper, with a hole in the centre, rather larger than the outside diameter of the globe, were let fall near it, the paper was instantly taken up by the current, and brought into a position encircling the globe, at the equator, and there maintained indefinitely.

PICTURES OF THE SEASON IN NEW YORK.[1]— III.

CERTAINLY the spring art-season has opened in an auspicious way. The Stewart sale did not show so reckless a throwing about of money, so unbalanced and over-wrought an enthusiasm as the Morgan sale of last year. Mr. Cornelius Vanderbilt purchased from it for the Metropolitan Museum the best picture the collection held for such a purpose — Rosa Bonheur's "Horse Fair." Mr. Seney, of Brooklyn, has since given to the same institution ten American and foreign pictures, some of them of the highest value; and now the bequest of Miss Catherine Wolfe has followed — two hundred fine foreign paintings and water-colors, and $200,000 as a fund to keep these pictures in proper order, and to add others to their number in future years. And finally the Academy exhibition has revealed a so much better spirit than usual on the part of its managers, and a so much better collection of pictures than usual, that its opening was greeted with a unanimous chorus of praise. If, now, some one would only purchase the Rembrandt portrait for the Museum, our cup of gratitude would be full!

Chief in renown among the Seney pictures is Le Rolle's large "Organ Rehearsal." It was exhibited last spring with the "Impressionist" pictures, though it had no slightest affinity with the rest of the collection. It was then recognized as one of the strongest, soberest and most accomplished works which had come to us from the younger generation of French artists — one in which "effectiveness" had not been striven for either in theme or in execution, but which was extremely effective none the less; one which was most admirable alike in drawing, in composition, in color and in feeling; one which had a distinctly "modern" accent, and not the least touch of eccentricity; one, therefore, which was instructive and inspiring in the best possible way, and not interesting and delightful merely. A fine example of Israels is also among Mr. Seney's gifts, and two small landscapes by Anton Mauve; also a superb George Innes — perhaps more welcome to good Americans and to lovers of the poetical as well as of the accomplished in art than any of the others; Mr. Millet's excellent *genre* called the "Cosy Corner"; and the most important of those charming landscapes which Mr. Charles Davis recently exhibited at the Reichard gallery.

All these pictures and the "Horse Fair" will be shown when the Museum opens after its coming spring re-arrangement. The Wolfe pictures we shall not see until the new wing of the Museum is complete, and a special apartment is prepared for them in accordance with Miss Wolfe's natural request. They will be found to include many modern French and a few German pictures, some of the highest artistic quality, and others of a more "popular" sort, but all, if I remember them aright, distinctly good examples of their respective painters. Knaus's "Holy Family" and Gabriel Max's "Greeting" are the best known of the second sort; and of the first sort I may name Meissonier's "Two Vanderneers," which is as fine a work of his as has ever come to this country, and in certain respects — notably in color — perhaps the very finest; and Jules Bréton's "Penitents," — a long line of peasants bearing tapers and passing down a narrow, steep, village street. In dramatic force and in execution this is a superb example — far superior to most of the canvases Bréton paints to-day. Gérôme's "Prayer in the Mosque" is another work familiar through engravings; and the collection also includes good examples of Decamps, Robert-Fleury, Cot, Kaulbach, Isabey, Alfred Stevens, and a long and varied list of equally well-known painters. Until now the Museum has scarcely had enough good modern pictures to be called even the nucleus of a good collection. But now, within a single month, it has been placed upon a par with all but the very best of our private galleries. With the exception of Mr. Vanderbilt's pictures, and of Mr. Erwin Davis's, I know of no other New York collection which, as a whole, the city could have been so glad to own as Miss Wolfe's.

It must be a new sensation to our National Academicians to find nothing but praise of themselves and their exhibition in the current pages of the press. But they need feel no false modesty in accepting it. They have deserved praise this year as much as they have sometimes deserved blame in the past — and praise for good performance as well as for good intentions. Their committee-on-selections was wisely chosen, and was instructed or allowed to aim at forming an excellent rather than a big collection. Never before was such a vigorous weeding-out seen within these walls — more than one supposed flower from actual Academic stems having, it is said, been thrown aside with those of less distinguished origin. Then the hanging-committee proved equally judicious. And as a result we have rooms which are comfortably filled but not crowded — no pictures scraping the sky-line or standing about the wainscot, and all being grouped in a way which, as a rule, gives the better pictures the better places, and which avoids as far as possible destructive juxtaposition. There is hardly a single picture in the collection which has not at least some small degree of merit — hardly one that is utterly futile, hideous or ludicrous. To say this only would be to say much by contrast with what we have been obliged to say in former years. But even more than this can be said. The average is better than one might have expected with two more large general exhibitions in immediate prospect, and the proportion of really good things is greater. And a few examples stand out above the others as pronounced, individual and most interesting successes. Chief among these are two paintings and — strange fact — one statue of heroic size.

Mr. Winslow Homer has painted on a moderate but effective scale an animated life-saving scene — two brawny, half-nude surfmen dragging to shore two unconscious, youthful bathers. The four figures form a magnificent almost frieze-like line — the surfmen erect and holding their rope on either side, and the bathers locked in each others arms in the centre, — all relieved against the blue-green mass of a great curling breaker. Such power combined with such grace in composition and line is a very rare quality in modern art; and its expression in art which is "realistic" in mood and "local" in its choice of theme is rarer still. But there is no modern artist who thinks more than Mr. Homer of absolute truth to nature — not even any among the French Impressionists; none who cares more than he for "representative" local themes; none who expresses life, action, character more forcibly; none who better knows the difference between true pictorial and pseudo-sculpturesque design; — and yet none whose work has a more marked degree of linear grandeur. And I know of none other who so combines all these qualities in his art. A most valuable lesson is therefore afforded by this art — the lesson that realism need not mean the death of *pictorial* idealism, truth need not mean ugliness, local themes need not mean the exclusion of grace of form, any more than the exclusion of charm of color. The coloring of this picture — which, by the way, is called "Undertow" — reminds one not a little of certain schemes one saw in the Impressionist collection; which is merely to say, of course, that when men really study out-door effects with a really fresh and open eye, their interpretations of it will often have much in common. It is a very bold scheme, the strong tints of the water being given without palliation, and its blue reflections on the wet flesh being recorded with extreme frankness. But seen at the proper distance it seems as truthful as it unquestionably is, and though a trifle crude, perhaps, is not harsh or cold, or in any way unpleasing. Had not our eyes been emasculated by a long course of studio-painting of similar effects, we should certainly not hesitate to call it very delightful as well as very impressive color.

Mr. Dewing's picture called "Days" is at the very opposite extreme of art. Interpreting Emerson's familiar little poem, it is of course idealistic, and not realistic painting. And its soft and tender color-scheme, and its accomplished and beautiful but somewhat vaporous handling exclude the possibility of any direct reference to natural, *plein air* effects. Its figures are beautifully grouped and finely expressive; and despite its literary inspiration it is not an illustration or a bit of painted literature but a true picture, well able to stand on its own intrinsic merits. Far from trying to contrast two such works as these, and to decide which of them is "better,"

[1] Continued from No. 587, page 150.

the student may well dwell for instruction upon their difference, learn therefrom how wide is the range of the painter's art, and learn too what is meant by a good result in each direction.

The statue to which I have referred is by Mr. John Donoghue, a young artist from Chicago who has studied in Paris and since worked in Rome, and who has recently returned to this country. It is in plaster, and designed for marble, and represents the youthful Sophocles leading the chorus of victory after the battle of Salamis. Here again, of course, is an ideal work; but its subject is such that it gave a chance for the most vigorous treatment and the strongest portrayal of emotion. The figure is that of a very young man — Sophocles at this time, I believe, was but sixteen — and is consequently thin. The light where it now stands exaggerates its thinness, strongly accenting the shadows on the torso; but seen in a discreeter illumination, I think it would be as pleasing as it now is vigorous. The youth — who is nude, save for his sandals — is represented in motion and in the act of singing. He has just taken a step towards the right, and rests upon his right leg, with the left extended, just touching the ground. His lyre rests high on his left shoulder — a lyre formed, according to tradition, of the shell of a tortoise and the horns of a ram; his head is turned partially towards it, and his right arm is raised and extended as having just struck the strings. The action is extremely well chosen, it seems to me, for it immediately explains itself to the dullest eye, and despite its vigor it has grace and repose; and the expression of the head is equally good. The face is classically, regularly beautiful, but individual and impressive; and though the mouth is half-open it does not unduly disturb that serenity which sculptured work always should preserve. It is rare indeed that we see in modern work — at least in this part of the world — so much beauty and sculptural *rightness* combined with so much expression — the mood rendered being naturally that of enthusiasm, inspiration, that of a young artist possessed by the combined influence of his art, of his patriotism, and of the inevitable pride resulting from his selection as the most beautiful young man of Greece. This expression is as well conceived and as distinctly rendered, I think, as the action of the body; and saying this I know I have said what will seem a great deal for a statue by a hitherto unknown hand. Technically I do not presume either to praise or to criticise the work. Perhaps it is very good in this way — perhaps it may have many faults to instructed eyes. All I can pretend to say is that it impresses even an uninstructed eye as interesting and *vital* — that it not only charms the sense of sight, but wakes a definite, strong, pleasureable and new emotion. And this proves, I think, that the artist has the root of the matter in him. Even though this statue may have faults — I have no reason to suppose it has, save the thought that I could not detect them were they present — it surely promises a future for its author if he continues in coming years to be as serious a student and as true an artist as he must have been in the past.

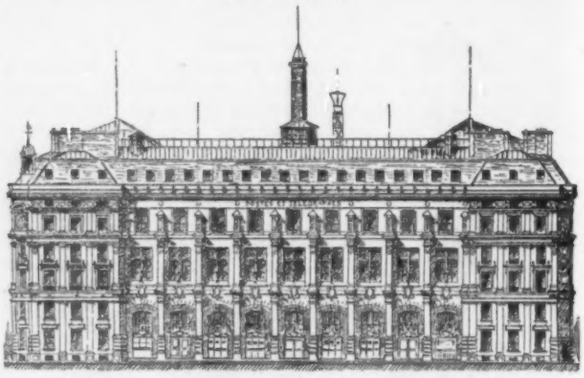
Minor works of sculpture in the exhibition also afford much satisfaction, notably two portrait-heads, by Mr. Warner. The painted portraits are hardly as numerous as usual, and few among them are of great interest. Munkácsy is represented by two which are hardly more than sketches — as such technically very clever, but as pictures not very delightful. And Mr. Alden Weir has a delightful portrait of a little child, and Mr. Freer an attractive one of a lady in a black evening dress.

Landscapes are not so conspicuous this year as usual. There are few of large size or great importance but, on the other hand, very many modest works of considerable excellence. One of the best as well as largest is Mr. George Innes, Jr.'s cattle-piece, and another is Mr. Walter Palmer's winter scene. Mr. Homer Martin sends several little pictures which are marvellously charming and poetic.

Two or three battle-pictures show work in the right direction — in the direction of individualized as against mere scenic battle-painting — the best of them being Mr. de Thulstrup's. *Genres* are numerous, and on the average infinitely better than they used to be only a few years ago. One of the most individual is Mr. Mowbray's Japanesey little "Rose Festival," which shows a charming sense for color, a delightful freshness and grace in execution, and no small amount of feeling for character too. One of the strongest — indeed the very strongest — in character is Mr. Kappes's negro interior. It is a pity that this extremely clever, serious, diligent and in other respects well-balanced artist should let himself be so seduced by a desire for strong effects of light that his tints grow chalky, and his figures sometimes seem to swim in the atmosphere of a flour-mill. One of the poorer *genre*-pictures in the collection excites the strongest interest and admiration — not for what it is, but for what it might have been if some one else had painted it. The excellence of the themes that may be found in our prosaic modern surroundings is illustrated by this dusky barn-like interior where women in bright cotton frocks are plaiting yellow straw around great shining green-glass demijohns and bottles. Such a chance as it was for effects of light, effects of grouping, effects of opaque and translucent color! But the utterly ugly and uninteresting result illustrates the fact that after all it is the painter who makes the subject, not the subject which makes or ever possibly can make the painter.

M. G. van Rensselaer.

PARIS GOSSIP.



The New Hôtel des Postes.

I WOULD like to say a word or two about our new Hôtel des Postes, M. Guadet, architect, concerning which there is a great deal said here, and which unfortunately is criticised too much. The opening, which should have taken place in August, 1886, has not yet occurred. This delay, which has greatly inconvenienced the merchants who counted on the trade which must be brought into the quarter by the location there of the post-office, has finished by becoming a grievance to the public at large, who, relying unadvisedly on articles contained in journals of greater or less credibility, have laid upon M. Guadet the responsibility for these delays. They have even gone so far as to pretend that the Hôtel des Postes, absolutely unfit for its intended service, was going to be sold to a great dry-goods house; that it was badly conceived, badly lighted, and in every way insufficient; that its height, which obliged the letters to rise and descend, was highly defective in the sense that it was the cause of a loss of time, etc.; this ought to have been done, that ought to have been done, the other ought to have been tried; in short, everybody gave his advice, and criticised, without, I believe, knowing a single word of the merits of the question. And it must be confessed that through being forced to read or listen to one thing, people finished by asking themselves if the thing was not true.

I desired to inform myself of the real truth of all these rumors. I visited the building, and I left it absolutely convinced that it answers perfectly the service that is expected of it.

I will, if you are willing, examine the particular criticisms which have been directed at this unfortunate building, and reply to them. "A post-office ought, to assure prompt service, to be flush with the sidewalk." In the first place, is this assertion supportable? Is it really shorter to make the mail-bags travel over a horizontal distance than to raise them by means of an elevator to the height of two or three stories, whence they descend rapidly by inclined chutes? For my part I do not believe it. The elevators employed are formed of platforms one above another, which always remain horizontal and parallel, even at the upper and lower points. At each story stops, at the same time every six seconds, a platform to receive the letter-pouches; altogether they can raise 120,000 kilogrammes per hour, and run from the sub-basement to the roof. As to the descent, it is effected in a few seconds over inclined planes arranged in spirals. Rapidity of service is thus obtained in a perfectly satisfactory manner. Next, could there be found in the very centre of Paris a site of 30,000 metres (the floor area which is actually occupied by the different branches of the post-office), and, admitting that it could be found, at what price could it be obtained? The expropriations have cost 1,800 francs per metre. If the inhabitants of an entire quarter had been obliged to move, could the property have been acquired at any such price as this? M. Guadet maintains that expropriation under these conditions would have cost about 2,000 francs a metre, which gives for a surface of 30,000 metres the respectable sum of 60,000,000. Now they have actually spent 14,000,000, which shows a saving of 45,000,000 at least. It seems to me that this was quite worth while. As to the cost of the building, it is plain that to roof 30,000 metres on one floor would have cost somewhat more than to roof several superposed floors of 7,500 metres each. Let us now pass to the next criticism, which can only be refuted by examining the building. "The post-office is badly lighted!" This criticism can only be brought forward by persons who have not seen it, or who, during their visit, wore colored glasses. All the rooms front either on the façade or upon interior courts sufficiently large and spacious; but to tell the truth, the rooms lighted from glass-roofed court-yards are at the moment somewhat dark, because the windows have not been washed, and the dust, the removal of which awaits the inauguration of the building, has accumulated on them; but let these people who do not desire to see clearly stop and think a moment. One does not see clearly! In heaven's name, when the blinds of a window are closed does one see clearly in a room? Wait until they are opened. Finally, "the Hôtel de Postes is too small." For this the same answer. Go, look for yourself, and you will discover that not only is it sufficiently large, but that provision for a large increase in the working force has also been made. Upon the first floor, where the distribution of the letters for Paris is made, there is a considerable space which is not occupied. The same can

be said for the second floor, where the sorting of provincial letters goes forward, and, finally, on the third floor, large halls occupying almost the whole width of the building are for the moment without definite destination.

The lighting has been studied, and provision made for the time when electricity shall entirely replace gas. Everywhere during my visit I detected an endeavor to discover the most practical means for facilitating the work of the post-office, and I can affirm that M. Guadet is perfectly blameless for the delays which prevent the opening of the building. Nevertheless, there must be a reason. Alas, yes; and this reason we shall find in the elevators, which are not working in a perfectly satisfactory manner. There is in the mechanism of these elevators a wretched cast-steel crown, with helicoidal teeth, which is at the bottom of all the trouble. It ought to be very strong and not wear out. Germany could certainly furnish us with these pieces, perfectly satisfactory in every way, but the Government wished to address itself exclusively to French ironworks, which are unfortunately imperfectly equipped for this kind of work. There have been experiments: several pieces could not be used, and it was necessary to begin all over again; and as perfection of working is indispensable, there have been delays, and this is all there is about it. But add to these mishaps the bad humor of all those who suffer perforce by this delay, the discontent of the employés of the post-office itself — who are, perhaps, not very well satisfied with the new arrangement, which makes them work in front of and not behind those partitions and gratings, which used to allow them to breakfast or read at their leisure, while the public wearied itself on the other side — and you will have in these things the explanation of all the false rumors, the prejudiced criticisms, and the fantastic explanations which have caused so much ink to flow. So much for the inside. As for the outside, I confess that I do not greatly admire the façades. Here is to be found a regrettable heaviness and details badly studied; but as space is limited, I prefer not to dally over a criticism which may, after all, not be shared by others, and which is merely a matter of taste.

We had, not long ago, a very interesting exhibition at the Gal-Gallery Georges Petit. It was the exhibition of the sketches, drawings and studies of M. Toché, a young artist charged with the decoration of the Château de Chenonceaux, and particularly of the large ball-room. What constituted the interest in this exhibition was that M. Toché had made all his studies in water-color, and of proportions unknown in this medium, which is ordinarily reserved for what is fine and delicate. M. Toché handles water-colors as the great masters handled oils. He makes you a decorative composition, life-size, with vines and light which are really incredible; draped figures, nude figures, draperies, vases of flowers, garlands, everything, all in water-color. What *brio!* what color! what ability! Here is a *virtuoso* in water-colors. M. Toché joins to this a very perfect draughtsmanship. There were studies of charming ceilings, of decorative panels, and some travelling sketches. His draperies in water-color had the texture and plushiness of oils. What intensity in his tones! What sparkling play in his lights! An ass harnessed to a cart loaded with three peasants is absolutely lifelike. The air palpitates, the ass pricks up his ears, his hide is covered with real hairs, and at the least movement of the animal the cart-wheel will turn. It is charming, and what simplicity of rendering! I like less the nude figures, of which the modelling in water-color is a little brutal, and the flesh-colors are a little too uniformly on the bistre, the yellow or the gray, or finally become chalky. But that is neither here nor there. This exhibition has been a revelation of a real and a very original talent, and evidences in M. Toché the temperament of an artist and decorator. While visiting this gallery, I look back on the exhibition, a few months ago, of the competitive drawings for the decorative paintings for the marie at Pantin, in the environs of Paris. I was at that time astonished by the poverty of the works submitted. No original ideas, no drawing, no imagination, and an unfortunate tendency, as I look at things, when it is a matter of decoration, to modernize the subject. The majority of the competitors had sought modern scenes, reviews of troops, groups of school-boys, national fêtes, with flags, illuminations and fire-works; everything was shrill and blustering, a perfect orgie of glaring colors. It was horrible! And what sort of decorative effect could be produced with these modern crowds, these men in blouses, these street boys of Paris? These modern fashions, will certainly change just as have the preceding fashions, and can consequently only become caricatures. Such a subject could only pass muster by reason of the ability of the composition and the talent shown in the rendering; but there was nothing of the sort. Nevertheless, there were happily, by way of relief, some good conceptions, and it must be said that the most seductive designs and the most suited to decorative purpose had for their subjects allegorical scenes, or at least scenes from early days. MM. François Lafon, Schommer (with a patriotic subject, the "Defense of Pantin," by Gen. Compaur in 1814, very well treated and showing real talent) and Henri Lévy, whose pieces were premiated, made themselves particularly remarked, as also MM. Hervy and Michel Lançon. It is M. Schommer who, as the result of the second step of the competition, has just been classed first and awarded the execution of the work, which will cost about 36,000 francs.

The annual exhibition of the water-colorists has opened lately. It is charming. The water-colorists, who were not long ago a mere handful, are now very numerous, and the exhibition counts three hundred and twenty-four numbers. All are interesting and worthy of being mentioned; but I wish to speak particularly of those which are treated purely in water-color, without body-color. There are, to be sure, some pretty things rendered with the aid of body-color; but I cannot avoid being far more impressed by real water-colors; and here in the first line I place Madame Madeleine Lemaire, with her admirable flowers and fruits. Some raspberries are marvellous in their freshness and transparency. They offer a chance to say with truthfulness that one "could eat them." Harpignies exhibits some charming landscapes and views of Paris; Dubufe fils, some seductive dancers surrounding a morsel of ballet music in a very original fashion, and a Marguerite and Faust; Maurice Leloir some graceful subjects for fans, etc. I perceive that it will be necessary to mention all, for in every one there is talent and attractiveness — Lami, Isabey, François, Jeanniot, Marand, Escalier, Pujol, Duez, Détaille. There are others, also — M. Besnard, who, according to some, has a great deal of talent and is an original artist. I agree to this last expression, for original he is. As to his talent, I cannot understand a word of it.

There were pitiable exhibitions in the two galleries of the Place Vendome and Rue Volney. Here it is always the same thing, and all you can distinguish are Carolus Duran, Henner, Bonnat, Lefebvre, and some other leaders, without whom these little exhibitions would have no being.

I should like to say a few words on the works for the Exhibition and the new Station of St. Lazare, but I have already gossiped enough, and will postpone these two subjects, which are still sufficiently new, to another time.

M. BRINCOURT.

THE DESTRUCTION OF HOUSE REFUSE.[1]

THE disposal of dead animals, garbage, dust and ashes not suitable for the sewers, and difficult to get rid of by dumping, is a matter which, so far as I know, has been handled with us in the crudest manner, and the same is true, generally, of Europe.

In 1877, there was built at Leeds one of the so-called "garbage destructors"; and either shortly before or after, the same apparatus was put up at Heckmondwike, Blackburn, Bradford, Warrington and Derby in England, and at Kralingen, near Rotterdam, in Holland. The first destructor at Leeds was erected at Burmantofts, two miles from Leeds Town Hall, in a northeasterly direction, and the second at Armley Road, about one mile westerly of the same point. The destroying furnace is the Fryer Patent Destructor.

For a description of this I cannot do better than quote from Mr. Hewson's report of 1884: —

"The destructor (at Burmantoft) consists of ten compartments or cells (five back to back) formed of brickwork, lined with fire-bricks, and tied with iron rods; it occupies a space of thirty-six feet by twenty-four, and twelve feet in height, and is so arranged that there is one inclined road leading from the adjoining road up to a platform, against and higher than the top of the destructor, onto which the refuse is carted, and another inclined road leading from the same adjoining road down to the level of the firing-floor, by means of which the mortar, charcoal, old iron, etc., are carted away.

"Each of the cells is capable of destroying six tons of refuse in twenty-four hours, and consists of a sloping furnace with hearth and fire-grate covered in by a reverberatory arch of fire-brick, with one opening at the top for the admission of the refuse, and another opening at the side, near the top, for the gases to escape into the flue, and a furnace frame and doors for the withdrawal of the clinkers. The refuse, which is tipped onto the top cells, is pushed down the incline or throat with a long iron prong, and slides forward onto the sloping hearth, whence, when sufficiently dry, it is helped forward onto the fire-bars, where it burns somewhat fiercely, the fire-brick arch above concentrating the radiant heat upon it. The opening for the entry of refuse is divided from the opening for the exit of gases by a partition-wall with a bridge. These prevent the refuse, which is heaped up immediately below, from finding its way into the flue also. At intervals of about two and a half hours, the clinkers are withdrawn through the furnace doors, but the charge of refuse is maintained permanently at the top. The effect of this is that no doors are required, the charge keeping down all smoke. The result of the process is that everything is consumed, or converted either into clinkers or a fine ash. Every two cells are also provided with an opening

[1] Extract from a paper by W. Howard White, read before the American Society of Civil Engineers, and published in the *Journal* of the Society.

(with doors) for the introduction of infected mattresses, diseased meat, etc., onto the fire, where everything is readily consumed without causing a smell in the works.

"The gases from the furnaces on the way to the chimney-shaft pass through a multitubular boiler, six feet in diameter and ten feet in length, and make steam to drive a horizontal engine with twelve-inch cylinder and two-foot stroke, which works two mortar-mills with pans eight feet in diameter. In these the clinkers made in the destructor are mixed with lime and ground into an exceedingly strong mortar, which is readily sold at five shillings per ton. No fuel of any kind is required, the ashes mixed with the refuse being amply sufficient. The old tins and iron which have passed through the furnace are sold for old metal at from five to fifteen shillings per ton; but if collected and sold unburned, they fetch one pound per ton. This is on account of the solder value saved by non-burning.

"The clinker from the furnaces is twenty-five per cent, by weight, of the refuse consumed."

A carbonizer was formerly used for the special treatment of market refuse, with a view to converting it into a high grade manure; but as it was found that eighty per cent of the charcoal obtained is simple earth, and therefore of little value as manure, the carbonizer was discontinued, and the whole of the refuse is treated in the ordinary destructor.

The original chimney at Burmantoft was about eighty feet high. As complaints were received of the smells from it, a new one, one hundred and fifty feet high, has been built; and in order to mitigate the discharge of dust over the neighborhood, the horizontal flue has been given the shape shown in the section *C D*, in which the depressions on the sides are to catch the dust [the middle portion of the floor of the flue is raised about two feet above the floor of the depressions mentioned], which is removed weekly through doors at the end of each block of cells. Since the rearrangement, no nuisance of any kind is reported.

The Burmantoft destructor consumed during the year ending August 31, 1884, as follows: —

Rubbish	1,538	tons.
Ash-pit rubbish	23,207	"
Beds	45	
Mattresses	96	
Pigs	58	
Cows	9	
Sheep	9	
Quarters of bad meat	4	

This was the product of about one hundred thousand people. The cost was as follows: —

EXPENDITURE.

	£	s.	d.
To cost, £7,282 1*s.* 1*d.* Repayment of debt by equal annual instalments of principal and interest during sixty years, at 3½ per cent	291	17	9
" Labor for one year	585	1	0
" Lime	34	18	4
" Depreciation, at 2½ per cent, covering repairs	182	0	6
" Gas, water-rates, etc.	126	19	7
	£1,220	17	2

RECEIPTS.

	£	s.	d.
By Mortar	97	18	11
" Charcoal	20	9	6
" Scrap iron	14	15	11
Balance	1,087	12	10
	£1,220	17	2

The Armley destructor sold, for some reason or other, much more mortar, and therefore, while its total expenses were about the same, the net cost of operating was only £842 4*s.* 6*d.*

To compare the cost of running these destructors with that of the removal of refuse otherwise, I will take the case of New York, where the removal of rubbish, etc., after being delivered at the water-front, to deep water, where it is now dumped, costs from $75,000 to $200,000 annually for a population of about 1,500,000. As the cost in Leeds is about $50 per one thousand per annum, the same rate applied to New York would give $75,000 per annum. The circumstances in Leeds are, however, much more favorable than in New York, since the city has a thinly-settled suburb completely surrounding it, and the destructors can be placed on moderately expensive land not available in New York (the Armley destructor at Leeds is, however, somewhat central in position). The rate of interest in Leeds is about three-fourths of what would have to be paid here, and the cost of labor perhaps two-thirds.

Altogether, it seems safe to say that the annual cost per thousand of the population, including all expenses of wear and tear, interest, etc., should not be much, if any, more than double those at Leeds, or $100 per one thousand, viz., $150,000 per annum for New York, which leaves a margin for contingencies or profit of from $25,000 to $50,000.

When we have paid this we have absolutely destroyed all injurious elements in the rubbish, in the only way which the present state of science indorses as effectual, and we have avoided the nuisance caused by dumping the rubbish into the ocean nearly entirely, the ashes left after burning being a small and innocuous element.

It has been claimed that there is not enough fuel in the rubbish of New York to maintain the necessary fire, but this seems to need proof in view of the English experience. One reason alleged for this is the practice of the poorer population of washing the cinder out of the ashes and reburning it, letting the ashes and the finer cinder go into the sewers. If so, it is time that this practice was stopped, by attaching penalties to such washing, and by obliging the owners of tenements to provide dust and ash spouts, into which the ashes could be sifted instead of into the sewers.

IN this same connection we may mention the prolonged discussion in the House of Commons, on the bill introduced by the Vestry of Kensington, seeking for power to acquire land whereon to erect furnaces for the destruction of refuse, which, the *Sanitary World* says, has drawn so much attention to this means of dealing with dust-bin refuse, that it may be well to supply some particulars of what is proposed to be done in the case in question. Our readers will not need to be informed that the system of refuse destruction which the vestry wishes to introduce is by no means a new system, for it has long been in use; but the plan prepared by Mr. Weaver, the surveyor to the Kensington Vestry, is a new adaptation of it, with some important improvements.

Under the existing system at Kensington, part of the refuse is taken to a brick-field in Wood Lane, by Shepherd's Bush, just outside the parish boundary, and part is "barged" to the sea beyond the Nore. The former portion is screened, the grit or sand being then made into bricks and the residue burned in the open air. To get rid of that part of the refuse costs the Vestry about 3*d.* a ton; sending the refuse away in barges costs from 1*s.* to 2*s.* 6*d.* a ton. There being in Kensington parish some 37,000 loads of house refuse, and 24,000 loads of street refuse, in all 61,000 loads, to be annually collected and disposed of, the total cost, under the present system, is something like £25,000.

By the bill now before Parliament, the Vestry seeks powers to acquire about four acres of land at Notting Hill, for the purpose of forming a depot for the parish refuse and erecting appliances for treating it. The contents of the dust-bins will be cremated in a furnace of the type known as "Fryer's Destructor." This cremator, proposed to be erected, will consist of twenty cells or fireplaces with inclined hearths and reverberatory arches; the refuse being carried up an inclined roadway and delivered upon a floor about ten feet above the ground-level and immediately over the cells. Through openings or trap-doors coinciding in number with the cells, the refuse is shot and burned, the mass falling forward as the lower portion is consumed and reduced to clinkers, which are raked out at intervals. Each cell is capable of cremating six loads in twenty-four hours, the clinker residue being about equal in bulk to one-sixth of the unburned refuse. The clinker or slag it is proposed to use for road foundations and for grinding up into mortar. The flue from each cell emerges into one large common flue or chamber, where the united heat is about 1,200° Fahrenheit. The products of combustion are then passed into an extra cremator, termed a muffle chamber, where a clinker fire is kept burning, and by a series of arches the fumes are caught and reflected downwards several times into this clear clinker fire. From the muffle-chamber, where the heat is maintained at 1,800° Fahrenheit, the heated fumes pass onward and upward through a chimney-shaft 180 feet high. Certainly it is difficult to believe that any noxious thing would survive such an ordeal.

The road refuse is to be treated differently. On the same site Mr. Weaver proposes to erect extensive machinery for washing and screening the sweepings from the macadam and flint streets of the parish, the clean sand and grit thus obtainable being extremely valuable, the former for consolidating roads under the steam-roller, and the latter for spreading on roads in frosty weather. A series of experiments, conducted at a cost of £200, has proved that every cubic yard of mud thus treated, at a cost of 8*d.* per yard, will yield about half a yard of re-usable material, worth about 5*s.* per yard. This washing machinery will be driven by steam generated in a multitubular boiler, through which the heat from the furnaces will pass before finally escaping up the chimney-shaft. Incidentally it may be mentioned that Mr. Weaver calculates that the furnaces will be capable of developing 100 horse-power — enough, if desired, to light the whole of the parish by electricity.

As to the cost, it is only the refuse of the northern-half of the parish which is to be taken to Notting Hill; that of the southern-half will be sent to the barges, as at present. The present charge for this northern district is £11,654 a year. It is estimated that the net cost under the proposed new plan would be £5,549, a saving of £6,105, this being Mr. Weaver's own calculations.

The subjoined communication, which has been addressed to a contemporary by Mr. G. R. Strachan, the surveyor of the parish of Chelsea, forms a valuable contribution on the question at issue, coming as it does from a skilled and competent witness. Mr. Strachan says: —

"The House of Commons is about to be asked to throw out the Kensington Vestry Bill on its third reading. The Bill as it now stands gives that vestry authority to buy land and erect a series of furnaces thereon to burn the household dust of the inhabitants of the district. It has been through the ordeal of a three days' examination in committee, when counsel, witnesses and foes were heard against it. The Committee declared the preamble proved with amendments, yet notwithstanding this, the House is invited to throw over its own committee and the bill. In other words, the House is asked to commit the mistake it made in the case of the Birmingham Sewage Bill, when a Tory minister rose and successfully moved the rejection of the bill after it had borne an exhaustive inquiry in committee — a step which is now looked back upon with all but universal regret. An act of injustice is therefore intended. It devolves

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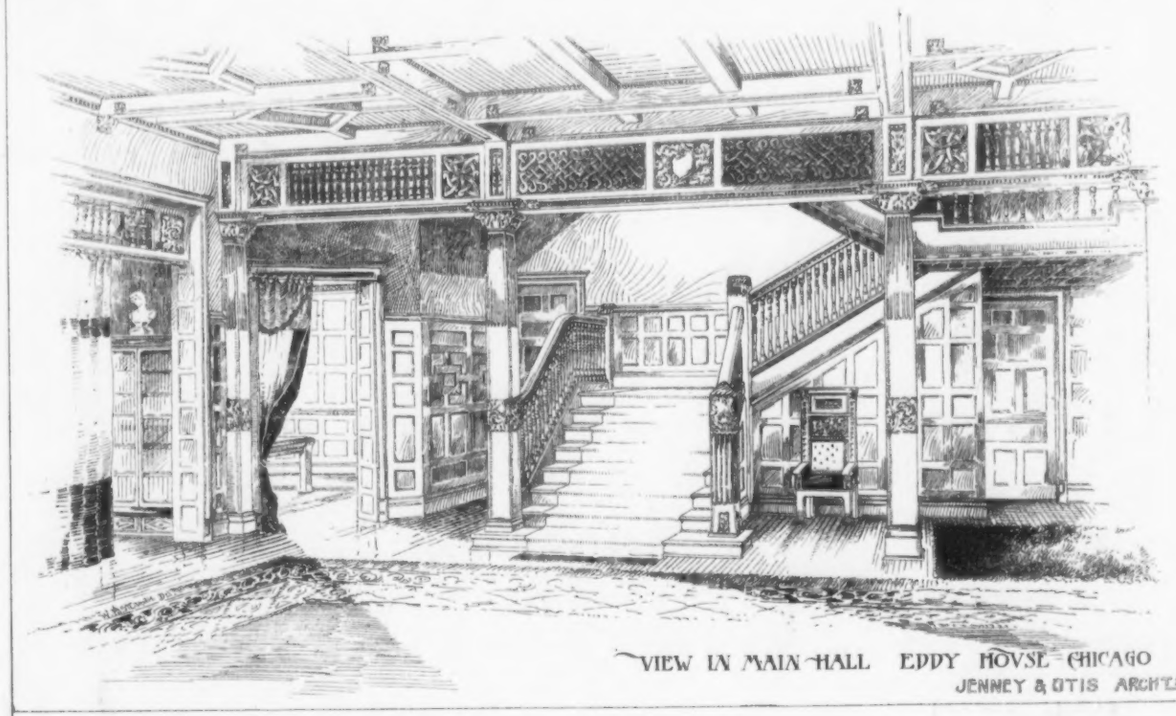

VIEW IN MAIN HALL EDDY HOUSE CHICAGO
JENNEY & OTIS ARCH'TS

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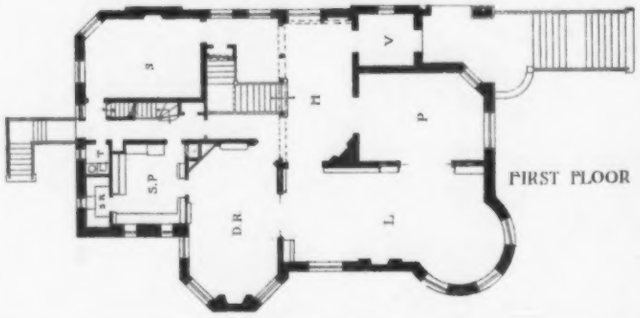

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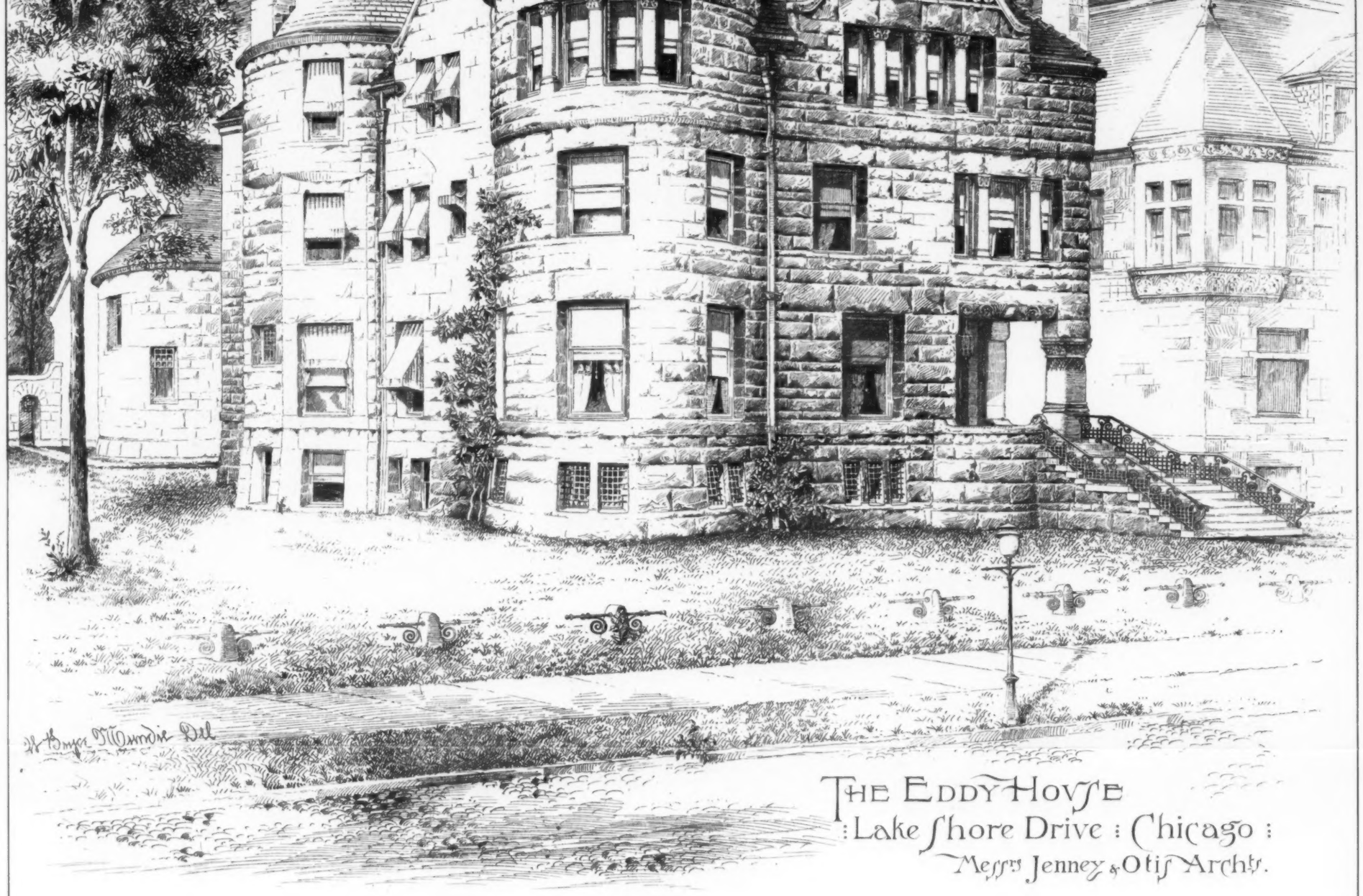

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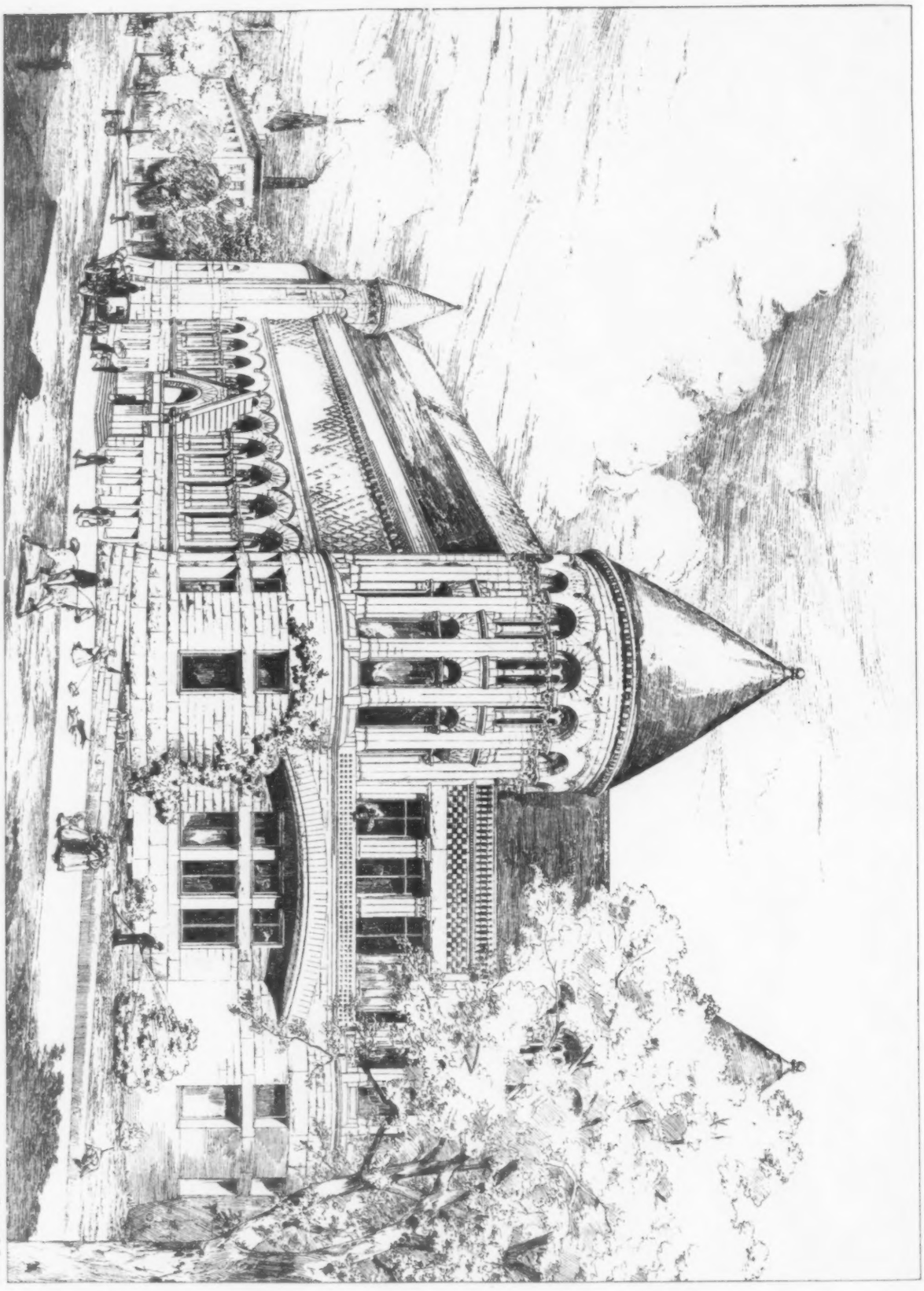

DESIGN FOR YOUNG MENS ASSOCIATION BUILDING, BUFFALO, N.Y.
H. H. RICHARDSON, ARCHITECT.

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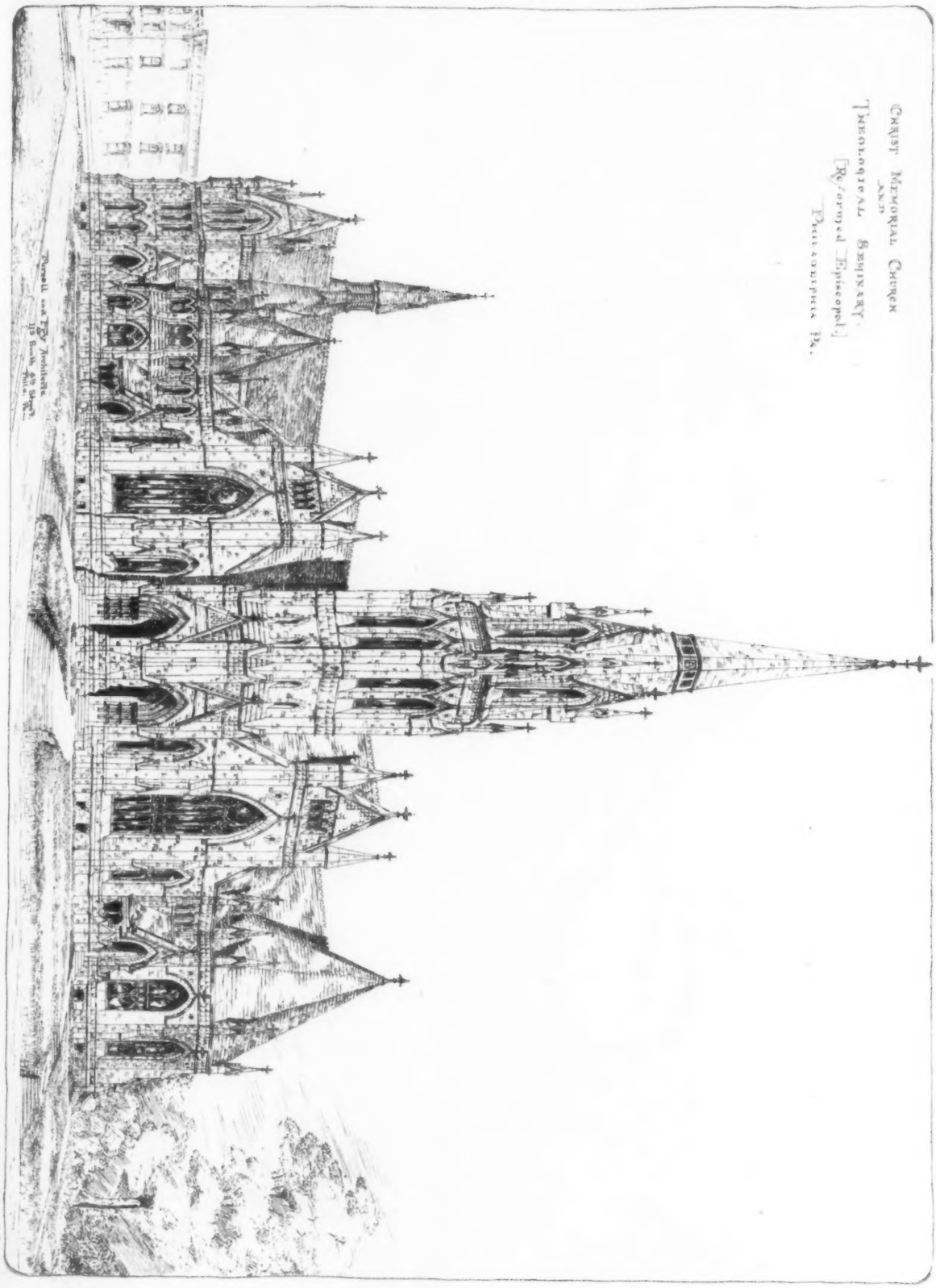

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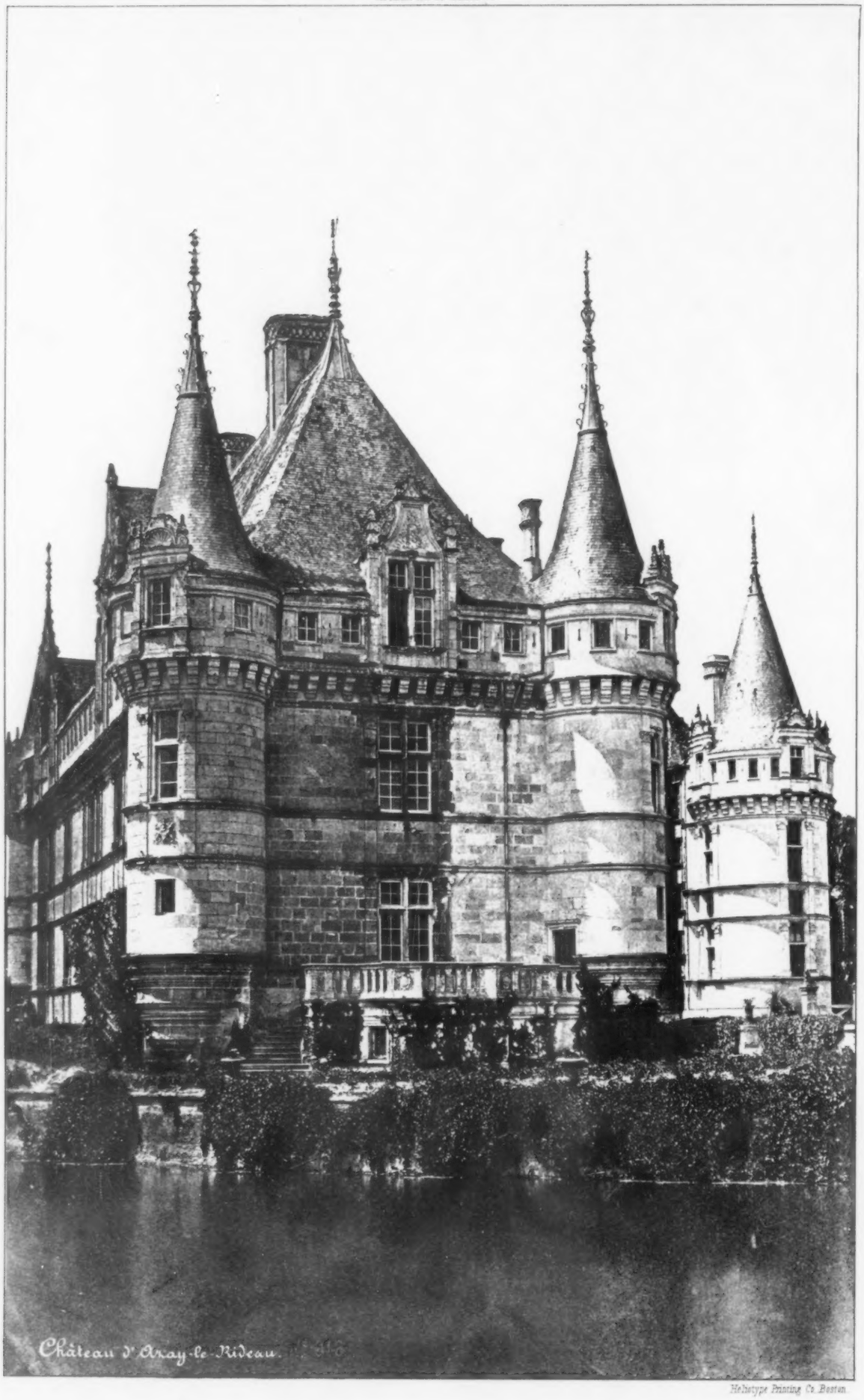

Château d'Azay-le-Rideau.

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American Architect and Building News, Apr. 23, 1887. No. 591

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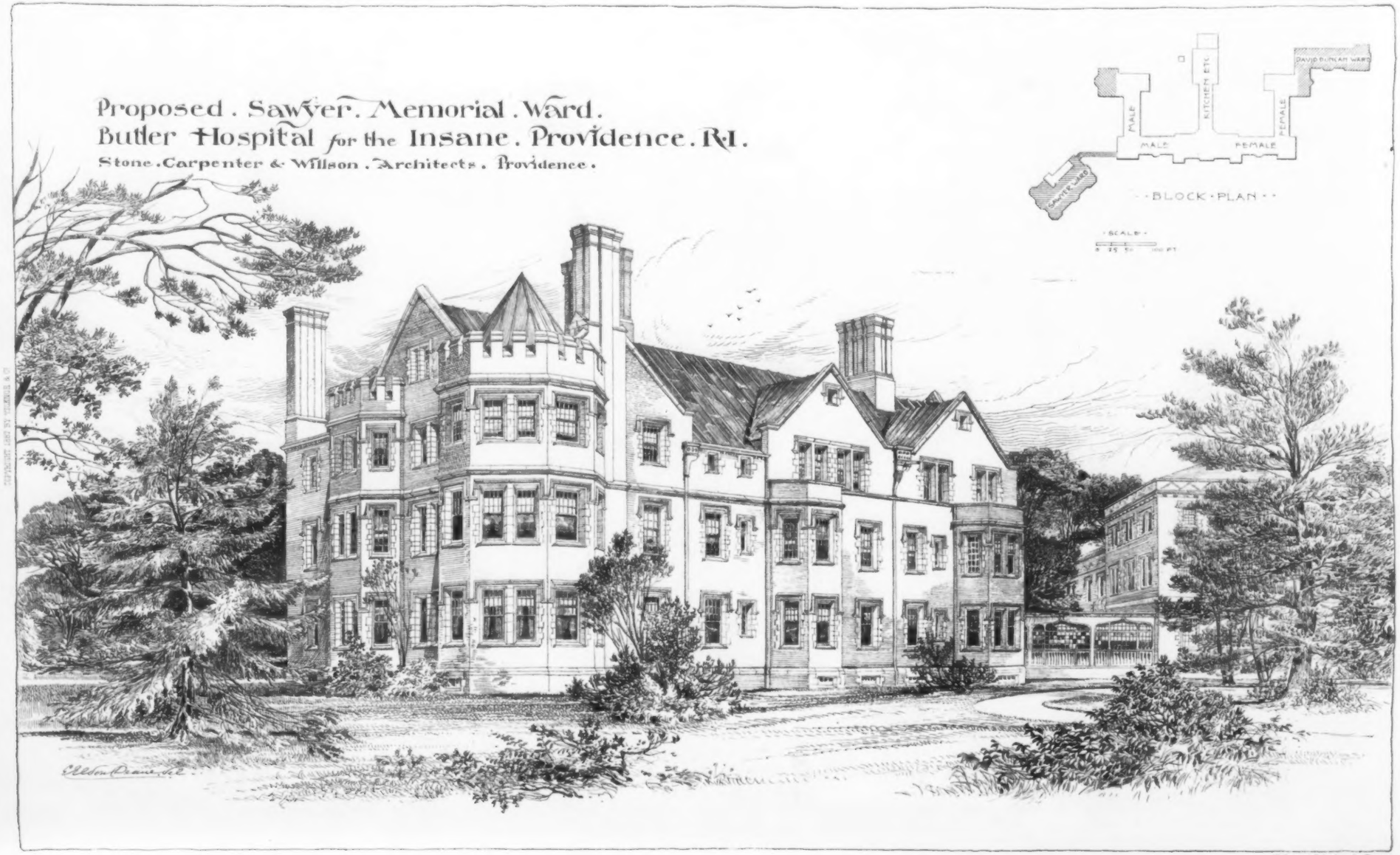
Stone . Carpenter & Willson . Architects . Providence .



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upon those who have knowledge on the question to say what they know. At Leeds, this method of disposing of the dust has been in operation for ten years. The Armley Road destructor is in a populated neighborhood, and does its work without offence or nuisance. Of Newcastle-on-Tyne, Manchester, Warrington, Nottingham, Derby, Birmingham, Southampton and Whitechapel the same can be said. I have seen each of these in operation in their everyday work, and can unhesitatingly say that the fear of nuisance from them is without foundation. The dust is destroyed as it comes in, expeditiously, and without offence. At Letts Wharf, Lambeth, against the river, the city destructor does its duty daily, and I venture to say that not one person in one hundred who passes it is aware of its existence.

"The dust disposal question is a serious one for Londoners. The Chelsea Vestry has just come to the end of a three year's contract for barging the dust down the river, under which the price paid was 8*d.* per load of three cubic yards. To-day it starts a new contract for the same end, and pays 2*s.* 3*d.* per load of three cubic yards. Three hundred and forty per cent increase in cost in three years ought to make men think twice before they deprive a vestry in a worse position than Chelsea is of a certain, harmless, and economical method of dust disposal. To persons like myself, who see huge sums of public money wasted in opposing useful and essential refuse disposal schemes, the suggested action of throwing out this bill is little short of sinful. I know of cases where property owners have exerted a most violent opposition to sewage schemes, and have been paid large sums as compensation, because they would have to leave their ancestral homes (so they said), and who put the money in their pockets, and live at the present time in the same home with the sewage-works at their door. It makes one laugh to see the same game going on at every turn. I feel convinced that when the Kensington destructor is built and in operation, the persons who are now so bitter in their opposition will wonder what caused them to make such a hubbub about the bill.

"Let me add that I have no interest in this bill beyond a general and public one, that I have not received either coin or kind from the Kensington Vestry at any time, and that I have none of that gratitude towards them which is prompted by an expectation of favors to come."

On the other hand, Mr. C. J. Perceval, Honorary Secretary of the "Museum" Ward Conservative Association of Kensington writes as follows:

"One might easily imagine from the speeches made by Sir Algernon Borthwick and Mr. Labouchere on the above subject that the inhabitants of South Kensington generally were in favor of the destructor. Such, however, is not the case; for, when the member of Parliament for Kensington South Division attended a meeting of the Museum Ward Conservative Association, on the 1st day of April last year, and a gentleman proposed that Sir A. Borthwick should be asked to support this bill, no seconder appeared, and the feeling at the meeting was strongly averse to any such waste of money. The reasons against the destructor are many: 1. It is a wicked and wilful waste of money to burn indiscriminately all the valuable refuse from this the largest parish in London. 2. That it would cost (including all expenses) little, if any, less than £100,000, which, as (3), we are already in debt (including our metropolitan share of £1,000,000) to the amount of £1,900,000, is considerably in excess of our rateable value. 4. We have the example of the parish of Newington (St. Mary) of how to deal with our refuse. The net cost to that parish, is but £1,500 per annum for scavenging, against ours of over £32,000. 5. The example of St. Mary, Newington, is being followed by Hampstead. 6. We have far greater facilities than St. Mary's, Newington; for we have the Thames, a canal, and several freight sidings of different railways in our parish. 7. Through the exertions of Mr. John Braye we have several farmers ready and willing to take all and more than we can supply them with. So that we have no excuse for this sinful extravagance; but until the rate-payers bestir themselves, and take the trouble to send up men pledged to economy, and other than those whose sole delight is in spending other people's money, we shall never lighten our heavy rates."

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE ROTCH TRAVELLING-SCHOLARSHIP DRAWINGS. — PLATES XLVI, XLVII, XLVIII.

[Issued only with the Imperial Edition.]

THE "EDDY" HOUSE, CHICAGO, ILL. MESSRS. W. L. B. JENNEY & W. A. OTIS, ARCHITECTS, CHICAGO, ILL.

THE house is situated on the Lake Shore Drive, near Lincoln Park, overlooking Lake Michigan, one of the finest building sites in the city. The material is Hallowell white granite. Interior finished in hard woods. Hall and stairway in quarter-sawed white-oak; parlor in Spanish satinwood; library and dining-room in mahogany. The style indicated by the published designs is preserved throughout the house. There is also a stable on the lot, built of Hallowell white granite, the interior trimmed in Georgia pine finished with spar varnish.

DESIGN SUBMITTED FOR THE YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, BUFFALO, N. Y. H. H. RICHARDSON, ARCHITECT.

MR. RICHARDSON was very unwilling to have any of his unexecuted designs published, and that is probably the reason that this design was first exhibited in the pages of an English contemporary, the *Building News*.

CHRIST MEMORIAL CHURCH AND THEOLOGICAL SEMINARY, PHILADELPHIA, PA. MESSRS. PURSELL & FRY, ARCHITECTS, PHILADELPHIA, PA.

THIS church, which is now building at the corner of 43d and Chestnut streets, will cost $150,000.

PROPOSED SAWYER MEMORIAL WARD FOR THE BUTLER HOSPITAL FOR THE INSANE, PROVIDENCE, R. I. MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R. I.

CHATEAU AT AZAY-LE-RIDEAU, FRANCE.

NOTE. — Circumstances obliged us to use, last week, a gelatine print sooner than we expected, and consequently we were not then prepared to say that the architect of St. Thomas's Church was Mr. R. M. Upjohn, while the houses for Messrs. Webb and Twombley were designed by Mr. C. B. Atwood, both of New York.

BRICKWORK.

IN a recent lecture, delivered at Carpenter's Hall, London, Professor T. Roger Smith, F.R.I.B.A., after describing the kinds and processes of making bricks, said: So much for bricks. To make brickwork, however, another ingredient is required — namely, mortar or cement. All mortars, and, in fact, all the cementing materials used (except bituminous ones) in bricklaying have lime as their base, and depend upon the setting quality of quicklime, which has to be mixed with sand or some suitable substitute for it, to make mortars. Limes and cements are far too wide a subject to be dealt with as part of an evening's lecture on another topic, and no doubt they will hereafter form the subject of a lecture or lectures. To-night I propose only to remind you that there are such substances as these, and that they possess certain qualities and are obtainable and available for the bricklayer's purposes, without attempting an investigation into the chemistry of cements, or the manufacture, etc. Ordinarily, brickwork may be divided into brickwork in mortar and in cement; but there are many qualities of mortar, and several sorts of cement. Mortar made with what are called fat or rich limes — that is to say, nearly pure lime, such as is got by calcining marble or pure chalk, sets slowly, with difficulty, and is rarely tenacious. Burnt clay or brick reduced to powder improves the setting of such lime, especially if the two materials be calcined together; so will an admixture of cement. Mortar made with what is known as slightly hydraulic lime — that is to say, lime containing a small proportion of clay, such as the gray stone lime of Dorking, Merstham, and that neighborhood, sets well, and is tenacious and strong. Mortar made with hydraulic lime — that is to say, lime with a considerable admixture of clay, such as the lias lime, sets under water or in contact with wet earth. It is best to use this lime ground to powder, and not to mix so much sand with it as is used with stone lime.

A sort of mortar called selenitic mortar, the invention of the late General Scott, has been made use of in many of the buildings of the School Board for London, and was first employed on a large scale in the erection of the Albert Hall. The peculiarity consists in the addition of a small dose of plaster-of-Paris (sulphate of lime) very carefully introduced and intimately mixed. The result is that the mortar so made sets rapidly and is very hard. It is claimed that a larger proportion of sand can be used with selenitic lime than with ordinary, thus counterbalancing the extra expense occasioned by royalty under the patent and special care in mixing. When a limestone contains twenty to forty per cent of clay, it becomes what is called a cement, and its behavior is different from that of limestones with less clay. Ordinary limestones are, as you know, calcined in a kiln. The

material which comes from the kiln is called quicklime, and, on being dosed with water, it slakes, and crumbles to powder, and in the state of slaked lime is mixed up with mortar.

Cement-stones are also calcined; but the resulting material will not fall to pieces or slake under water. It must be ground very fine, and when moistened sets rapidly, and as well under water as in air, and becomes very hard and is very tenacious. Brickwork in mortar will always settle and compress to some extent. Not so brickwork in cement, which occasionally expands, but is never to be compressed. This quality and the rapid setting, tenacity and strength of brickwork in cement make it a most valuable material to use in those buildings or parts of a building where great steadiness and strength are wanted, and in sewage and dock work, where there is water to contend with. A good many cements made from natural stones used to be employed, such as Medina, Harwich, Atkinson's or Roman cements. The last named is the only one which is now much employed, except locally. It has the quality of setting with exceptional rapidity, and is on that account sometimes the best material to employ; but for almost every purpose the artificial compound known as Portland cement is preferable. Portland cement is made largely near Rochester. Its materials are simple and cheap. They may, without much departure from the truth, be said to be Thames mud and chalk; but the process of manufacture requires care and thoroughness. The article supplied, when of the best quality, has great strength, and is quick-setting, and is far better than what was manufactured from stones in which the ingredients existed in a state of nature.

In England we slake our lime and make use of it while it is fresh; but it may interest you to know that the custom in Italy and parts of France is different. There it is customary to slake the lime long before it is wanted, and to deposit it in a pit and cover it up with earth. In this condition it is left for months — I believe in Italy for a year — and when taken out it is stiff, but still a pasty substance. It is beaten, and more water added, and it is then made into mortar with sand. It is claimed for mortar made in this way that it is exceptionally strong.

Now that we have considered bricks and partly considered mortar, it remains to pay some attention to brickwork. The simplest and most familiar work for a bricklayer to do is to build a wall. In doing this his object should be to make it as stout as possible for the thickness, and this stoutness can only be obtained by interlacing the bricks. If they were simply laid on the top of each other the wall would be no more than a row of disconnected piles of brick liable to tumble down. When the whole is so adjusted that throughout the entire wall the joints in one course shall rest on solid bricks and shall be covered by solid bricks again — in short, when the whole shall break joint — then this wall is said to be properly bonded, and has as much stability given to it as it can possibly possess. There are two systems of bonding in use in London, known as English bond and Flemish bond. English bond is the method which we find followed in ancient brickwork in this country. In this system a course of bricks is laid across the wall, showing their heads at the surface, hence called "headers," and next above comes a course of bricks stretching lengthways of the wall, called "stretchers," and so on alternately. With the Dutch fashions came in Flemish bond, in which, in each course, a header and a stretcher alternate. In either case, at the corners, a quarter-brick, called a closer, has to be used in each alternate course to complete the breaking joint. There is not much to choose between these methods where the walls are only one brick thick; but where they are thicker the English has a decided advantage, for in walls built in Flemish bond of one and a half brick thickness or more there must be a few broken bricks, or bats, and there is a strong temptation to make use of many. If this takes place, the wall is unsound. Many of the failures of brickwork in London houses arises from the external walls, where they are one and one-half bricks thick, being virtually in two skins; the inner nine inches does the whole of the work of supporting floors and roof, and when it begins to fail, the outer face bulges off like a large blister. I have known cases where this had occurred, and where there was no header-brick for yards, so that one could pass a five-foot rod into the space between the two skins and turn it about. This is rather less easy to accomplish with English bond, and there are other advantages in the use of that bond which make it decidedly preferable, and it is now coming back into very general use. There are some old varieties of bond, such as garden-bond and chimney-bond; but of these I only wish to draw your attention to what is called cross bond. The name is not quite a happy one. Diagonal bond is hardly better. The thing itself is to be often met with on the Continent, and it is almost unknown here; but it would be worth introducing, as the effect of it is very good. French cross bond, otherwise diagonal bond (*liaison en croix*), is English bond, but with the peculiarity that in every fourth course one header is made use of in the stretcher course at the quoin. The result is that the stretchers break joint with each other, and all the joints range themselves in diagonal lines, and if, in any part of the work, headers of a different brick are introduced, the appearance of a cross is at once brought out; and even without this the diagonal arrangement of joints is very perceptible and pleasing. Besides wall-building, the bricklayer has many other works to perform. He has to form fireplaces, flues, chimneys, and the flat trimmer-arches which support the hearth, and has to set the stove, kitchen-range, copper, etc., in a proper manner. He has to form various ornamental features, and much else, some of which we shall have an opportunity of noticing rather later.

The strangest business, however, which is intrusted to the bricklayer, is building downwards — by the method known as underpinning — so that, if a foundation has failed, a sounder one at a greater depth may be reached; or, if a basement is required under an existing building which has none, the space may be excavated and the new walls built so as to maintain the old. This work has to be done with great caution, and bit by bit, and is usually left to experienced hands. The mode in which the mortar joints of a brick wall are finished where they show on the external or internal face is a matter worth a moment's attention. It is important that the joints of the work shall be so finished as to keep out wet and to be as durable as possible, and it is desirable that they should improve, or, at any rate, not disfigure the appearance of the work. The method which architects strongly advocate is that the joints shall be struck as the work proceeds — that is, that very shortly after a brick is laid, and while the mortar is yet soft, the bricklayer shall draw his trowel, or a tool made for the purpose, across it, to give it a smooth and a sloping surface. This is best when the joint is what is called a weather-joint — *i.e.*, one in which the joint slopes outward. Sloping it inward is not good, as it lets in wet; finishing it with a hollow on the face is often practised, and is not bad. Bricklayers, however, most of them prefer that the mortar joints should be raked out and pointed — that is to say, an inch or an inch-and-a-half of the mortar next the outer face be scratched out and replaced with fresh mortar, and finished to a line. In cases where the brickwork is exposed to frost, this proceeding cannot be avoided, because the frost damages the external mortar of the joints; but the bricklayers prefer it at all seasons of the year, partly because brickwork is more quickly done if joints are not struck at the time; partly because they can, if they like, wash the whole surface of the work with ochre, or other color, to improve the tint; and partly because, whether the washing is done or not, it smartens up the appearance of the work. The misfortune is that this pointing, instead of being the edge of the same mortar that goes right through, is only the edge of a narrow strip, and does not hold on to the old undisturbed mortar, and so is far less sound, and far more liable to decay. There is a system of improving the appearance of old decayed work by raking out and filling up the joint, and then making a narrow mortar joint in the middle of this filling in, and projecting from the face. This is called tuck-pointing; it is very specious, but it is not sound work.

Brick arches are constantly being turned, and of many sorts. An arch consists of a series of wedge-shaped blocks, known as voussoirs, arranged in a curve, and so locking one another together that unless the abutments from which the arch springs gives way, it will not only carry itself, but sustain a heavy load. It is a constant practice to cut bricks to this shape and build them into an arch, and these are sometimes cut and rubbed; sometimes, when the work is rougher, they are axed. But in order to save the labor of cutting, arches are sometimes turned with the bricks left square, and the joints wedge-shaped. In this case the rings should be only half a brick each, so that the wedge need not be so very much wider at back than at face, and they are set in cement, as that material adheres so closely and sets so hard. Arches of two or more half-brick rings in cement are good construction, and are also used for culvert work. A less satisfactory sort of arch is what is called the flat arch. Here, instead of being cambered as it ought to be, the soffit is straight; but the brickwork being deep, there is room enough for a true arch that does the work, and for useless material to hang from it. These arches are generally rubbed or axed, and are very common at the openings of ordinary windows; but no one who has studied construction can look at them without a kind of wish for at least a slight rise, were it only two inches. Sometimes, when these straight arches are to be plastered over, they are constructed in a very clumsy manner, which is anything but sound, and from time to time they give way.

The weight of brickwork, of course, varies with the weight of the individual bricks; but stock brickwork in mortar weighs just about one hundredweight per cubic foot, or twenty cubic feet to the ton. In cement it is heavier, about one hundred and twenty pounds to the cubic foot. The strength of brickwork depends, of course, on the strength of the weakest material — *i.e.*, the mortar; though when it is in cement the strength of brickwork to withstand a weight probably approaches that of the individual bricks. Some experiments quoted in Rivington's "*Notes*" give the following as the crushing weight per foot — that is to say, weight at which crushing began — of piers having a height of less than twelve times their diameter.

	Tons per foot.
Best stocks, set in Portland cement and sand 1 to 1, and 3 months old	40
Ordinary good stocks, 3 months old	30
Hard stocks, Roman cement and sand 1 to 1, 3 months old	28
Hard stocks, lias lime and sand 1 to 2, and 6 months old	24
Hard stocks, gray chalk lime and sand, six months old	12

The rule given in a popular hand-book, that brickwork in mortar should not have to carry more than three tons per superficial foot, and in cement more than five tons, is probably sound, as in no building ought the load to approach the crushing point, and, indeed, there are many sorts of foundations on which such a load as five tons per foot would be too great to be advisable.

It is a rather interesting inquiry, whenever we are dealing with a building-material, if we ask what can we best do with it, and for what is it ill-fitted. The purposes for which brick can be best used depend, of course, upon its qualities. Speaking generally, such purposes are very numerous and very various, especially the utilitarian

purposes, though rich and varied ornamental work can also be executed in brickwork. Perhaps the most remarkable quality of brickwork is that it can be thrown into almost any shape. It is in this respect almost like a plastic material, and this peculiarity it owes chiefly to the very small sizes of each brick as compared with the large masses of brickwork of most buildings. Stone is far less easily dealt with than brick in this respect. Think for a moment of the great variety of walls, footings, piers, pilasters, openings, recesses, flues, chimney-breasts, chimney-shafts, vaults, arches, domes, fireproof floors, corbels, strings, cappings, panels, cornices, plinths, and other features met with in constant use, and all formed by the bricklayer with little trouble out of the one material — brickwork! A little consideration will convince you that if the same material furnishes all these it must be very plastic. As a limitation, we ought to note that this almost plastic material cannot be suddenly and violently dealt with — that is to say, that, with the exception of some sorts of arches, you cannot form any abrupt or startling feature in brickwork, and you are especially limited as to projections. If you wish to throw out any bold projection, you may support it on a long and sloping corbel of brickwork; but if there is not room for that you must call in some other material, and form the actual support in stone, or terra-cotta, or iron, and when you have gained your projection you may then go on in brickwork if you like. Brick cornices should be steep, but cannot be bold, and so with other ornamental and structural features.

A noteworthy property of brickwork, and one of immense value, is that it is thoroughly fireproof; in fact, almost the only perfectly fireproof material. There is an interesting account of the Great Fire of London, by one of the eye-witnesses, and among the striking phenomena of that awful time he notes that the few brick buildings which existed were the only ones able to withstand the raging fire when it reached them. In our own day a striking proof of the same thing was given in the great fire in Tooley Street, when Braidwood lost his life. I witnessed that conflagration for a time from London Bridge, and its fury was something not to be described. There were vaults under some of the warehouses stored with inflammable materials, the contents of which caught fire and burnt for a fortnight, defying all attempts to put them out; yet these very vaults, though they were blazing furnaces for all that time, were not materially injured. When the warehouses came to be reinstated it was only found necessary to repair and repoint them a little, and they were retained in use. The fact is, that the bricks have been calcined already, so has the lime in the mortar, and the sand is not affected by heat, so there is nothing in brickwork to burn. Against each of these good qualities, however, we may set a corresponding defect. If brickwork is easily thrown into any shape, it is also easily thrown out of shape. It has little coherence or stability, less than masonry, and very considerably less than timber. If any unequal settlement in the foundation of a brick building occurs, those long zigzag cracks with which we, in London, are only too familiar, set themselves up at once, and if any undue load, or any variation in load, exists, the brickwork begins to bulge. Any serious shock may cause a building of ordinary brickwork to collapse altogether, and, from time to time, a formidable accident occurs owing to this cause. The fact is, the bricks are each so small compared to the mass of the work, and the tenacity or hold upon them of even fairly-good lime-mortar is so comparatively slight that there is really but little grip of one put upon another.

Persons who have to design and construct brick buildings should never forget that they have to be handled with caution, and are really very ticklish and unstable. One or two of the methods of overcoming this to some extent may be mentioned. The first is the introduction of what is called bond. At the end of the last century it was usual to build in, at every few feet in height, bond-timbers, which were embedded in the heart of the walls. If these had always remained indestructible, they would, no doubt, have served their purpose to some extent. Unfortunately, timber both rots and burns, and this bond-timber has brought down many a wall, owing to its being destroyed by fire, and has, in other cases, decayed away, and caused cracks, settlements, and failures. The more modern method of introducing a strong horizontal tie is to build into the wall a group of bands of thin iron, such as some sorts of barrels are hooped with — hence called hoop-iron. The courses of bricks, where this occurs, must be laid in cement, because iron in contact with cement does not perish as it does in contact with mortar. If in every story of a building four or five courses are thus laid and fortified, a great deal of strength is given to the structure. Another method, which has rather fallen into disuse, is grouting. This is pouring liquid mortar, about the consistency of gruel, upon the work at about every fourth course. The result is to fill up all interstices and cavities, and to delay the drying of the mortar, and brickwork so treated sets extremely hard. I have seen a wall that had been so treated cut into, and it was quite as easy to cut the bricks (sound ones though they were) as the mortar joints. Grouting is objected to because it interferes with the good look of the work, as it is very difficult to prevent streaks of it from running down the face, and it is apt to delay the work; but it is a valuable means of obtaining strong brickwork. Another and a more popular method is to build the work in cement, now usually Portland cement. This, of course, makes very strong, sound work, and does not involve any delay or dirt, like grouting, or the introduction of any fresh material, like hoop-iron; but it, of course, adds to the expense of the work considerably, as cement is much more costly than lime. I ought to add that the advocates of Scott's selenitic mortar claim that it not only sets quickly and hard, but that it is extremely tenacious, and consequently makes a much more robust wall than ordinary mortar. I daresay this is true; but I have not happened to see such a wall cut into, and this is the best test of solidity.

The second deficiency in brickwork which I am bound to notice is that, though it is very fireproof, it is far from being waterproof. In an exposed situation rain will drive completely through a tolerably stout brick wall. If water be allowed to drop or fall against it, the wall will become saturated like a sponge. If the foot of a wall becomes wet, or if the earth resting against the lower parts of it be moist, water will, if not checked, rise to a great height in it, and if the upper part of the wall be wet, the water will sink downwards. With most sorts of brick the outer face absorbs moisture whenever the weather is moist, and in time the action of the rain, and the subsequent action of frost upon the moisture so taken up, destroys the mortar in the joints, which are to be seen perfectly open, as if they had been raked out, in old brickwork, and in some cases (happily, not in many) the action of weather destroys the bricks themselves, the face decaying away, and the brick becoming soft. Against this serious defect in our staple building-material a series of precautions have been devised. Damp rising from the foot of the wall, or from earth lying round its base, is combated by a damp-course — a bed of some impervious material going through the wall. Damp earth may be kept off by surrounding the walls with an open area or a closed one — usually termed a dry area. Damp against the face of the walls may be partly combated by a careful selection of a non-absorbent brick with a hard face and by struck joints; but it is most effectually kept at bay by the expedient of building the wall hollow; that is to say, making the external wall of the house to consist of two perfectly distinct walls, standing about two inches apart, and held together by ties of earthenware or iron. The result is that the moisture blowing through the outer skin does not pass the cavity, but trickles down on the inner face of the outer wall, while the inner wall remains dry. The ties are constructed of shapes to prevent their conducting water themselves from without to the inner wall. In addition to this, a series of slates forming an intermediate protection is sometimes introduced, and forms an additional and most valuable screen against weather. Sometimes, the two skins of the wall are closer together — say three-quarters of an inch — and the space is filled with a bituminous material. A substance of a bituminous nature, called hygeian rock, has been, of late years introduced, and is being extensively used for this purpose — it is melted and poured into the open space hot, and quickly hardens. The use of such a material is open to the objection that no air can pass through it. The rooms of our houses are receiving air constantly through the walls, and much of the constant current up our chimneys is supplied, to our great advantage, in this very imperceptible manner. The house breathes, so to speak, through the pores of its brickwork. When this is rendered impossible, it seems clear that fiercer draughts will enter through the chinks and crevices, and that there will be a greater demand upon flues not in use, occasioning down-draught in the chimneys. Another mode of keeping out weather is to cement the face of the brickwork; but this hides up the work, and so tends to promote bad work, besides being often very unsightly.

Among other peculiarities of brickwork are the facilities for introducing different colors and different textures of surface, which it presents, the ease with which openings and arches can be formed in it, the possibility of executing ornament and even carving, and the ease with which brickwork will combine with other building materials. It cannot be well made use of for columns, though it may readily enough be turned into piers or pilasters. It cannot, generally speaking, with advantage be made use of for any large domes, though the inner dome of St. Paul's and the intermediate cone are of brick and stand well; but it is an excellent material for vaulting arcades and all purposes involving the turning of arches. Brickwork must be said to be durable, but it requires care. If not of the best, brickwork within the reach of the constant vibration caused by the traffic on a railway seems to be in danger of being shaken to pieces, judging from one or two instances that have come under my own observation. The mortar, and even in some cases the bricks themselves, will rapidly deteriorate if moisture be allowed to get into the heart of a brick wall, and in exposed situations this is very apt to happen. Care should always be taken to keep the pointing of external brickwork in good order, and to maintain all copings and other projections intended to bar the access of water coming down from above, and to stop the overflowing of gutters and stack-pipes, which soon soaks the wall through and through. Of course, if there is a failure of foundations, brickwork, as was pointed out earlier, becomes affected at once; but if these be good, and the materials used be sound ones, and if the other precautions just recommended be taken, it will last strong and sturdy for an immense length of time. In some cases, as, for example, in the Roman ruins, it has stood for fifteen hundred years under every possible exposure and neglect, and still shows something of a sturdy existence after all, though sadly mutilated. If we now return to the question, what can be well done in brickwork, no better answer can be given than to point to what has been and is being done, especially in London, and within our own reach and observation. Great engineering works, such as railway viaducts, the lining of railway tunnels, the piers and even the arches of bridges, sewage-works, dock and wharf walls, furnace

chimneys, and other works of this sort, are chiefly done in brickwork; and notwithstanding that iron is far more used by the engineer for some purposes and concrete for others now than formerly, still there is a great field for brickwork.

The late Mr. Brunel, who was fond of pushing size to extremes, tried how wide a span he could arch over with brickwork; and I believe the bridge which carries the G. W. R. over the Thames at Maidenhead has the widest arch he or any other engineer has successfully erected in brick. This arch has, it is stated, a span of one hundred and twenty-eight feet. It is segmental, the radius being one hundred and sixty-nine feet, and the rise from springing to crown twenty-four feet, and the depth of the arch five feet three inches. Now-a-days, of course, no one would dream of anything but an iron-girder bridge in such a position. Mr. Brunel's father, when he constructed the Thames Tunnel, lined it with brickwork, foot by foot, as he went on, and that lining sustained the heavy weight of the bed of the river and the river itself. If you leave London by either of the Southern lines, all of which are at a high level, you go for miles on viaducts consisting of brick arches carried on brick walls. If you leave by the Northern lines, you plunge into tunnel after tunnel lined with brickwork, and kept secure by such lining. Mile after mile of London streets, and those in the suburbs, present to the eye little but brick buildings; dwelling-houses, shops, warehouses, succeed one another, all in brickwork, and even when the eye seems to catch a change, it is more apparent than real. The white mansions of Tyburnia, Belgravia, South Kensington, and the neat villas of the suburbs are only brickwork, with a thin coat of stucco, which serves the purpose of concealing the real structure — often only too much in need of concealment — with a material supposed to be a little more sightly, and certainly capable of keeping the weather out rather more effectually than common brickwork would. More than this, such fine structures, apparently built entirely of stone, as are being put up for commercial purposes in the streets of the city, and for public purposes throughout London, are all of them nothing more than brick fabrics with a facing of masonry. Examine one of them in progress and you will find the foundations and vaults of brickwork, and not only the interior walls, but the main part of the front wall, executed in brickwork, and the stone only skin deep.

There are, however, two or three ways of making use of brickwork without covering it up, and of gaining good architectural effects thereby, and to these I beg now to direct your attention. The architect who desires to make an effective brick building, which shall honestly proclaim to all the world that it is of brick, may do this, and, if he will, may do it successfully by employing brickwork and no other material, but making the best use of the opportunities which it affords, or he may erect his building of brickwork and stone combined, or of brickwork and terra-cotta. Mr. Robson, till lately the architect to the School Board for London, has the merit of having put down in every part of the metropolis a series of well-contrived and well-designed buildings, the exterior of which, almost without exception, consists of brickwork only. If you examine one of his school-houses you will see that his walls are of ordinary stock brickwork, but usually brightened up by a little red brick at each angle, and surmounted by well-contrasted gables, and with lofty well-designed chimneys rising from the tiled roof. The window openings and doorways are marked by brickwork, usually also red, and sometimes moulded, and though I personally must differ from the taste which selected some of the forms employed (they are those in use in this country in the seventeenth and the last centuries), I cordially recognize that with very simple and inexpensive means exceedingly good, appropriate and effective buildings have been designed. Among examples of architecture wholly, or almost wholly, executed in red brick, I cannot pass over a building built many years ago, little known on account of its obscure situation, but a gem in its way. I allude to the schools designed by Mr. Wilde, and built in Castle Street, Endell Street. Of buildings where a small amount of stone is introduced into brickwork we have a good many fine specimens in London. One of the best — probably the best — is the library in Lincoln's Inn Fields. This is a large and picturesque pile, built under Mr. Hardwick as architect, in red brick, with patterns in the blank parts of the walls done in black brick. It has splendid moulded brick chimneys, and the mullions of the windows, the copings, the entrances, and some other architectural features done in stone. The building is a good reproduction of the style of building in Tudor times, when, as has been already mentioned, brickwork was taken into favor. Another building of the same class, but not so good, is the older part of the Consumption Hospital at Brompton. Brickwork, with a little stone, has been very successfully employed as the material for churches, and in many such cases the interior is of unplastered brickwork. Such churches often attain, when designed by skilful hands, great dignity and breadth of effect. St. Alban's, Holborn; the great church designed by Mr. Butterfield in Margaret Street; Mr. Street's church near Vincent Square, Westminster; and several churches of Mr. Brook's, such as he was kind enough to enable me to illustrate to-night, may be mentioned as examples of the sort. Mr. Waterhouse has built an elaborate Congregational church at Hampstead, which shows the use with which such effects of color may be obtained in interiors, and has kindly lent some drawings. Mr. Pearson's church at Kilburn may also be referred to as a fine example of brick vaulting.

Brick and terra-cotta seem to have a natural affinity for one another. Terra-cotta is no more than a refined brick, made of the same sort of material, only in every respect more carefully, and kiln baked. Its similarity to brick is such that there is no sense of incongruity if moulded or carved brickwork and terra-cotta are both employed in the same building, and this can hardly be said to be the case if the attempt is made to combine ornamental brickwork and stone ornaments. At South Kensington a whole group of examples of brickwork with terra-cotta meets us. The Natural History Museum, the finest of them all, is hardly fit for our present purpose, and it is as completely encased in terra-cotta as the fronts of the buildings in this avenue are in stone. But here are the Albert Hall, a fine specimen of mass and effect; the City and Guilds Institute; the College of Music, and some private houses, and blocks of flats, all in red brick with terra-cotta, and all showing the happy manner in which the two materials can be blended. In most of them there is a contrast of color; but Mr. Waterhouse, in the Technical Institute, has employed red terra-cotta with red bricks, as he also has done in his fine St. Paul's School at Hammersmith, and Mr. Norman Shaw has, in his fine pile of buildings in St. James's Street. The combination — namely, brick and terra-cotta — I look upon as the best for withstanding the London climate, and for making full use of the capabilities of brickwork that can be employed, and I have no doubt that in the future it will be frequently resorted to. Some of those examples also show the introduction of cast ornaments, and others the employment of carving as means of enriching the surface of brick walls with excellent effect. Here we must leave the subject; but, in closing, I cannot forbear pointing to the art of the bricklayer as a fine example of what may be accomplished by steady perseverance. Every brick in the miles of viaducts or tunnels, houses or public buildings, to which we have made allusion, was laid separately, and it is only steady perseverance, brick after brick, on the part of the bricklayer, which could have raised these great masses of work. Let me add that no one brick out of the many laid is of no importance. Some time ago a great fire occurred in a public asylum, and about £2,000 of damage was done, and the lives of many of the inmates endangered. When the origin of this fire came to be traced out, it was found that it was due to one brick being left out in the flue. A penny would be a high estimate of the cost of that brick and of the expense of laying it, yet, through the neglect of that pennyworth, £2,000 damage was done, and risk of human life was run. I think there is a moral in this story which each of us can make out if he will.

SOCIETIES

PETROLEUM.

At the regular meeting of the Engineers' club of Philadelphia held April 2, 1887, Mr. Max Livingston presented a paper on petroleum.

"Petroleum, known and utilized to some extent in different parts of the world since the dawn of history, was found to exist on our continent in 1627. About a century later the first mention is made of its existence in the now famous oil regions of Pennsylvania, where, until 1850, petroleum was collected from the surface of streams and pools in small quantities for medicinal purposes.

"The introduction of shale oil from Scotland directed the attention to our natural oil, and the practicability of its conversion into a purified illuminating oil was readily demonstrated.

"With the increasing demand the problem arose how to increase the production, which was solved by the late E. L. Drake, who, beginning to sink the first artesian oil-well in June, 1859, 'struck oil' the following August at a depth of 70 feet.

"The production of the Pennsylvania oil fields, which, during the year may have reached 2,000 barrels, did not fall below 20,000,000 barrels since 1879, and attained the enormous amount of 31,784,190 barrels in 1882."

Touching upon the geological question and the probable formation of the different oil sands; ventilating the different theories of the origin of petroleum; calling attention to the wide difference in the quality of the crude oil produced in different districts, and noting the gigantic pipe-line system, the speaker comes to the refining of petroleum, upon which he dwells at some length, describing the necessary apparatus, and explaining the process of manufacture of the different products, their uses and attending danger, emphasizing that, for safety and brilliancy of light, clean lamps and clean burners and *soft, loosely-woven wicks* are indispensable.

Discussing the question of petroleum as fuel, it is shown that even with the burners as now in use, which are far from perfect, it would, under many conditions, be found economical to substitute oil for coal.

In conclusion, our strongest competitor, the Russian oil, receives attention.

"Large as the production of oil in the United States is, it is eclipsed by the enormous production of Russia, which would make competition on our part in some of the most important markets of the world impossible, were it not mainly for two reasons, to wit: the superior quality of our oil, and the powerful, sagacious, and economical management here. The Russian oil has a much heavier specific gravity than ours, and produces but little naphtha, while our oil yields from ten to twelve per cent of this desirable material.

Russian refiners obtain only thirty per cent of illuminating oil; we produce upwards of seventy-five per cent. Last, but not least, the residuum from our crude oil is rich in paraffine wax, whereas the Russian oil produces none.

"But all these advantages do not allow us to rest on our laurels. The proximity of the Russian fields to important oil-consuming centres makes the Russian oil a constant menace, which will increase with the increasing facilities for transportation. Within the last year there has been considerable talk of laying a pipe-line (for refined oil) from Baku to the Black Sea — a distance of about 600 miles. Such a line would certainly lessen the difficulties of transportation. The present state of the petroleum trade, and the prospects for the near future, however, do not justify the consummation of the scheme, which is said to require $10,000,000. Under much more favorable circumstances than those now existing, capitalists could not expect any compensating dividends on their investment."

NATIONAL ASSOCIATION OF BUILDERS.

To the Master-Builders' Association of Boston, and all others interested.

The National Association of Builders of the United States of America was formed at a convention held for that purpose, in the City of Chicago, Ill., on the 29th, 30th and 31st of March last. At this convention twenty-six of the principal cities of the country were represented by delegates from their respective Builders' Exchanges, and after the adoption of Constitution and election of officers the convention adopted the following

DECLARATION OF PRINCIPLES:

"1. This Association affirms that absolute personal independence of the individual to work or not to work, to employ or not to employ is a fundamental principle which should never be questioned or assailed: that upon it depends the security of our whole social fabric and business prosperity, and that employers and workmen should be equally interested in its defence and preservation. While upholding this principle as an essential safeguard for all concerned, this Association would appeal to employers in the building trades to recognize that there are many opportunities for good in associations of workmen, and while condemning and opposing improper action upon their part, they should aid and assist them in all just and honorable purposes. That while upon fundamental principles it would be useless to confer or arbitrate, there are still many points upon which conferences and arbitration are perfectly right and proper, and that upon such points it is a manifest duty to take advantage of the opportunities afforded by associations to confer together, to the end that strikes, lockouts, and other disturbances may be prevented. When such conferences are entered into, care should be taken to state clearly, in advance, that this fundamental principle must be maintained, and that such conferences should only be competent to report results in the form of resolutions of recommendation to the individuals composing the various organizations participating, avoiding all forms of dictatorial authority.

"2. That a uniform system of apprenticeship should be adopted by the various mechanical trades.

"That manual-training schools should be established as a part of the public-school system, and that trade night-schools should be organized by the various local trade organizations for the benefit and improvement of apprentices.

"3. The Association recommends all its affiliated associations to secure as soon as possible the adoption of a system of payment 'by the hour' for all the labor performed other than 'piece-work,' or 'salary-work,' and to obtain the coöperation of associations of workmen in this just and equitable arrangement.

"4. That all blank forms of contracts for building should be uniform throughout the United States. That such forms of contract, with the conditions thereof, should be such as will give the builder, as well as the owner, the protection of his rights, such as justice demands. That whenever a proper form has been approved by this Association after consultation with the American Institute of Architects and the Western Association of Architects, we recommend its use by every builder and contractor.

"5. The Legislatures of the various States should be petitioned to formulate and adopt uniform lien laws, and every organization represented in this association is recommended to use its best endeavors to secure the passage of the same.

"6. Architects and builders should be required to adopt more effectual safeguards in buildings in process of construction, so as to lessen the danger of injury to workmen and others.

"7. We recommend the adoption of a system of insurance against injuries by accident to workmen in the employ of builders, wherein the employer may participate in the payment of premiums for the benefit of his employés. Also a system securing the payment of annuities to workmen who may become permanently disabled through injuries received by accident or the infirmities of old age."

All of which is respectfully submitted,

LEANDER GREELY,
IRA G. HERSEY,
J. ARTHUR JACOBS,
WILLIAM LUMB,
JOHN A. EMERY,
FRANCIS HAYDEN,
WM. H. SAYWARD,

Delegates to Convention from The Master-Builders' Association of Boston.

NOTES & CLIPPINGS

SUGAR IN MORTAR. — In reply to inquiries as to the use of sugar in "chunam" (the marble-like coating of Indian rooms) and in ordinary mortar, a correspondent in the Ganjam district of the Madras Presidency kindly informs us that the natives rarely use sugar in mortar for building purposes, but they use a highly-prepared mortar for plastering walls, ceilings, and veranda pillars, which takes a high polish and makes a capital imitation of marble. It will stand washing with soft-soap water, and is composed of the following: 100 pounds good slacked shell lime, 1¼ pounds country sugar (cheeney), the white and yolks of 16 eggs, 4 pounds good butter-milk, 25 pounds well-sifted, cleaned, fine sand, 1 pound butter, 50 pounds water. These articles must be well mixed and placed in a covered tub and allowed to remain so for three days before using. If this marble mortar could be tinted, it might be very useful in the inner walls of English houses, and in its white state it would come in for ceilings. Washable walls and ceilings of a permanent character are a great desideratum in this country for sanitary purposes, and especially in our smoky towns. Our correspondent gives the following composition as having been used for ordinary building purposes, and found very serviceable: 120 pounds lime, 240 pounds sand, 2 pounds Jaggery sugar, water in proportion. — *Produce Markets Review.*

HORSE-POWER. — A horse-power is a unit of power established by James Watt to be equivalent to a force of 33,000 pounds acting with a velocity of one foot per minute, which is the same as a force of 550 pounds acting with a velocity of one foot per second; that is to say, one horse-power is 550 foot-pounds of power or effects, or 11 man-power of 50 effects each. The product of any force in pounds, and its velocity in feet per second, divided by 550, gives the horse-power in operation. In Watt's rule for horse-power is given a velocity of only one foot per minute, which is equal to 0.2, or one-fifth of an inch per second — about the velocity of a snail. The force corresponding to this velocity is 33,000 pounds, or about 15 tons, which is too large for a clear conception of its magnitude, and a horse can never pull with such force. A horse can pull 550 pounds with a velocity of one foot per second, which is the most natural expression for horse-power. This expression is used on the continent of Europe as follows:

Countries.	Terms.	Eng. trans.	Units.	Eng. equiv.
English.....	Horse-power.	Horse-power.	550 foot-pounds.	550 foot-lbs.
French.....	Force de cheval.	Force-horse.	75 kilogr. metres.	542.47 foot-lbs.
German.....	Pferde krafte.	Horse-force.	513 Fuss-pfunde.	542.25 foot-lbs.
Swedish.....	Hast-kraft.	Horse-force.	600 skalpund fot.	542.06 foot-lbs.
Russian.....	Syl-lochad.	Force-horse.	550 Fyt-funt.	550 foot-lbs.

— *The Lumber World.*

A CORPORATION'S LIABILITY UNDER ITS INVITATION FOR DESIGNS. — Architect Thomas Walsh, of St. Louis, has placed the architects of this country under a lasting obligation to himself, for contesting, single-handed and alone, with a wealthy corporation the principle that promises made by the promoters of a competition constitute a valid contract which the courts can and will enforce. This litigation has covered a period of three years, and was carried up to the Supreme Court of the State, which has rendered a decision sustaining the plaintiff in every particular. The facts are briefly these: In April, 1883, Mr. Walsh received a letter from the St. Louis Exposition and Music Hall Association, inviting him to submit plans for a building to cost $400,000, in competition with other architects, on certain specified conditions. One of these conditions was that certain designs, selected as superior to the rest, should be premiated in the sum of $500 each, but that "the architect who is successful shall not receive $500, but he shall be engaged as architect and superintendent, and shall be paid for performing such duties, the usual commissions as adopted by the American Institute and the St. Louis Institute of Architects." Mr. Walsh notified the committee, in writing, of his acceptance of their invitation, and at the proper time and place he presented his drawings, according to the instructions given. His design was pronounced the best of all submitted, but after considerable delay and negotiation with various parties, the directors decided not to engage Mr. Walsh as their architect and superintendent, but to employ one architect to make plans according to their instructions, to engage another architect to make the elevations and to intrust the superintendence to a building contractor who had secured their confidence. Mr. Walsh testified that he offered to perform the duties of architect and superintendent, and declined other business in the expectation that the Exposition work would engross all his attention. The Association having refused so to employ him, he sued for five per cent on $400,000, amounting to $20,000, and was completely successful, the Court of Appeals and the Supreme Court both sustaining his plea. The defense set up by the St. Louis Exposition Association was, that their proposal had no binding force on them at all, being general and not addressed to any particular individual, and being "without consideration," also, that their invitation to competitors was "so indefinite, uncertain and ambiguous that it can furnish no intelligible and certain basis for a contract." But the courts ruled that general proposals become particular as soon as their conditions are complied with by any one, that the amount of time and skill applied by plaintiff in preparing his plans was as truly a "consideration" as anything else, and was amply sufficient to establish a contract, also, that there was no questioning the interpretation which the Exposition directors intended that competing architects should place on their artfully-worded invitation, and such meaning would be sustained by the courts in the interest of public morals. Quoting Lord Mansfield on interpretation of contracts, it was ruled that "the basis of all dealings ought to be good faith." — *Inland Architect.*

THE AMERICAN EXHIBITION BUILDINGS AT EARL'S COURT, ENGLAND. — The works on the buildings of the American Exhibition of the Arts, Industries, Manufactures and Products of the United States, which are

being erected on a large area of land, nearly twenty-three acres in extent, between the Earl's Court and West Brompton stations of the Metropolitan District Railway, are being very actively proceeded with, upwards of one thousand artisans and laborers being at present engaged on the works. For the varied purposes of the Exhibition, several buildings, distinct from each other, are in course of erection. The main building is situated at the extreme western boundary of the site, running northwards in the direction of Earl's Court from its principal frontage at West Brompton, near the West Brompton station, and approached from Lillie Bridge Road, close to the locomotive works of the District Railway. This building is 1,230 feet long and 120 feet wide, covering an area of upwards of 125,000 feet. Its elevation in the Lillie Bridge Road is faced with Portland cement. The chief business offices in connection with the exhibition are on the east and west sides of the frontage. Immediately to the west are separate buildings, one forming a dining-room 250 feet long and 90 feet wide, and the other an art-gallery 160 feet by 80 feet. The whole of these three buildings are fast approaching completion The height of the main building to the apex of its angular roof, which is being covered in with corrugated-iron and glass (the sides also being in corrugated iron), is upwards of 60 feet. The flooring is considerably advanced towards completion, and it is expected that this main section of the exhibition buildings will be ready for the reception of exhibits in about a fortnight. Amongst the numerous other structures which are in progress are several pavilions and sheds at different points on the ground, and the attractions of the exhibition will likewise include a theatre on the northwest side of the ground. On the northeast side, between four and five acres have been appropriated as an open-air encampment, which is intended to be utilized as a hunting-ground, where scenes illustrative of the "wild West" and prairie life will be given. On the south side of the encampment an immense grand stand has been erected. The ground in front of the stand will be formed into a race-course over a third of a mile in length. This encampment fills a triangular space, having on one side the West London Railway from West Brompton to Addison Road, and on the other sides of the triangle the district line from Earl's Court to Hammersmith, and the district branch from Earl's Court to West Brompton. The encampment, as well as the exhibition grounds generally, will be approached from Earl's Court station, in addition to the Lillie Bridge Road approach, by four bridges at different points on the District line. It may be added that a considerable portion of the space is being formed into colonades, divided, in American fashion, into "First Street," and so on in succession up to "Tenth Street." The works and buildings have been designed by Mr. O'Driscoll, who is acting as engineer to the exhibition commissioners, and are being carried out by the commissioners' own workmen. — *The Builder.*

The Temperature of Dwelling-Rooms. — Dr. D. Benjamin, of Camden, N. J., has made some observations regarding the subject of the varying temperature of our dwelling-rooms, which will be found of much practical importance. Every one knows in a general way that the air of rooms is colder near the floor and near the windows, but the very exact differences of temperature as obtained by Dr. Benjamin are very striking. For example, in a room 10 feet high, 12 wide and 20 long, with a good stove and steady fire, the temperature in the centre was found to be 78° Fahrenheit; 4 feet from the window it was 70°; 1 foot from the window 54°, and at the window 40°. At the height of the head the temperature was 75°, at the floor 50°, a difference of 25°. At the ceiling the temperature was 90°, when the temperature at the height of the head was 80°. The fact that the temperature of dwelling-rooms varies so widely explains, no doubt, the frequency with which young children, and even adults, take cold in the house. A child sitting on a nurse's lap in a temperature of 70° gets down and plays on the floor in a temperature 10 or more degrees lower, or runs to the window, a change of 20 or 30 degrees. The habit which ladies have of wearing slippers or light shoes in the house is the cause of many troubles, for these same reasons. The temperature of a room should be about 70° Fahrenheit. The hot furnace-heated houses of our cities cause a vast deal of nervous and respiratory trouble. The thermometer should be hung at about the height of the person's head, and, of course, not near the window or the stove.— *The Medical Record.*

A Peculiar Cause of Fire. — A peculiar fire happened in a suburb of Boston lately, and but for its timely discovery and extinguishment would have been added to the list of fires from "incendiarism," "defective flue," "rats," or any of the causes attributed where nothing is known of the cause. The lady of the house was going out to call, but heard a noise in the upper part of the house just as she was about to shut the outside door behind her. After some hesitation she re-entered the house, went up stairs, and found the chamber carpet burning quite briskly. Upon its extinguishment it appeared that the breeze from an open window had blown the match-safe from the bureau to the floor, broken it, and lighted the matches. We have heard of one similar case. It is the old moral: "Be careful with matches." — *Boston Commercial Bulletin.*

Artesian Wells in Tunis. — Southern Tunis is being transformed by Captain Landais, who is continuing the scheme of the late Captain Roudaire for an inland sea. The artesian wells now being sunk by him yield a large quantity of water, which is utilized in agriculture by the natives who collect round these new oases. Gardens are being created where, till recently there was nothing but sand, and avenues of trees are growing which will one day be bordered by houses. In a few years, if the operations are continued, the whole region will have been converted from a desert into a garden.— *The London Times.*

TRADE SURVEYS

Business throughout the country has been more or less interrupted and disorganized by the new and somewhat arbitrary freight rates which have taken the country by surprise. Public sentiment is rapidly undergoing some sort of a change in regard to this law, but it is too soon to state what the verdict will be. Apart from this element of uncertainty, business is good and prospects are bright. The manufacturing interests of the country as well as the building-material interests are forging ahead as if nothing were wrong. Manufacturers and builders know that there are urgent requirements, altogether legitimate, and that these requirements must be and will be filled. Taking the country all through, production is increasing rather than declining. The industries, large and small, are to-day more actively engaged than a week ago, or than a month ago. Demand is held in check in several industrial channels, but this very fact rather strengthens than weakens confidence, although it has created a laxity in prices. It is to be noted that where slight concessions have been made in several industries the volume of business has not increased correspondingly. The general sentiment in trade and commerce is that prices are not abnormal, and there is nothing to gain by a retrogression in values. There is no attempt made on the part of producing interests to crowd up prices, nor on the part of consumers to crowd them down. Values are as steady and the expanding demand in all directions furnishes assurances, if they were needed, that fluctuations, if any, will be within very narrow limits. Architectural and building authorities all over the country furnish much additional interesting evidence this week of an increasing activity in building operations. Encouraging evidences are furnished, especially in the West, where railroad building is being pushed ahead, even at this early period. The distribution of merchandise East and West during the past two weeks has been very large. The new railroad rates throughout the Northwest are in favor of the lumber manufacture, and a great deal of lumber is being moved in all directions. It is to be particularly noted as bearing on the lumber question, that a good many architectural implement-manufactories are to be erected in the States of the Northwest this season. Besides this feature, the projection of mills, furnaces, shops, and foundries show that great manufacturing activity is assured. In Eastern cities, notably in New York, this year's building operations will be exceptionally heavy. Real estate continues active in all cities East and West, and recent authoritative statements show that in a number of manufacturing towns house-building is to be entered into on a large scale, in which manufacturers, land-owners and lumber-dealers are combining. Lumber of all kinds is firm in prices, and this fact rather stimulates than weakens prices. City real estate will not, in a general way, advance in value in the same proportion that suburban real estate will be improved, because of the evidently growing tendency of small manufacturers as well as large to avoid the increasing taxations and expenses of city locations.

The iron trade has been quiet, but there is every reason for predicting a revival of demand that will strengthen prices. Since the first of the year the increase in the weekly production of anthracite and bituminous coal has been nearly 13,000 tons per week.

The arrivals of foreign material at the three principal Atlantic ports have been large, especially for the last two or three weeks, but the markets, at home and abroad, have not been favorable to the placing of much business on the other side. Railroad-builders are much concerned at the oversold condition of American mills, and are only awaiting a favorable turn of the tide to place large orders abroad. All manufacturers of building-material, from railroad-material down, have the assurances of a heavy and continuous demand. The brick-makers are crowding their capacity, which, in not a few cases have materially improved. The threatened strike at Philadelphia has been adjusted. Brick-making machinery is in active demand. Manufacturers of all kinds of glass — plate, skylight and window — have made a sort of canvass of the country's requirements, and are satisfied that the producing-capacity will not result in a weakening of prices. The threatened difficulty at Pittsburgh will be adjusted by arbitration. The manufacture of artificial products in stone and lumber and the marbleizing process are increasing. This season's slate output will be the heaviest known. The saw and planing mills, and the works turning out wood-working machinery, as well as the carriage and wagon works, are, with an occasional exception, starting in under better auspices than ever before. In some quarters a good deal of complaint is made about cutting competition, but no practical harm seems to result. Judging the condition of the industries by their expanding tendencies, it can be safely asserted that all of them find sufficient encouragement to enlarge their output in the face of the small margins. A summary of all the leading commercial facts and indications of the past week justifies the statement that the country is gaining in confidence in the soundness of the commercial and industrial foundation. The consumptive capacity of the country must expand. The export trade will exercise a favorable, though minor influence. All of the staple products of the country are in good demand. The leading products of the Northwest and Southwest are in moderate supply in all distributing centres. Wool is inactive and depressed. Cotton is strong and active. Coal is dull, though there will be a reviving demand next week, from present indications. Trade, manufacturing, and railroad combinations of one kind or another continue to multiply. As an instance of railroad combination reference may be had to the virtual establishment of a pool in anthracite last week. The trade combinations which have been effected through the winter will, no doubt, accomplish some good in steadying values and in enabling manufacturers to guard against overproduction. There is, beneath the surface of trade, evidence of an increasing cohesiveness, having for its object a conservative control over competition, which, under the feudalism of our past industrial growth, resulted in destructive competition. The few strikes that have recently taken place have been mild and well mannered. Labor is receding gently from some of its advanced and radical positions. The Supreme Court of Connecticut has recently given a hint which will not be lost on the labor organizations. The courts in other States are one after the other defining the rights and duties of employers. Out of all this seems to be growing a more conservative feeling and a desire to profit by arbitration. Employers are discovering that they can arbitrate to much better advantage after they have effected a thorough trade organization. Labor has been encouraged to strike and agitate during the past year or two largely on account of the comparatively defenceless position of employers. The inducements to trade-unionism are likely to decline in force during the next two years through the operation of natural causes. Much political action will be taken by existing political organizations to meet all just demands of labor. European immigration will control the value and price of labor on this side largely. The inevitable recurrences of industrial depressions will be a third factor which will equalize things in the long run. All these and some other tendencies are working to give labor a fixed value, or rather a fixed ratio with the results of labor, taking one year with another. Those employers who are apprehensive of the growth of an arbitrary power on the part of labor will be agreeably disappointed. Just now, in the transition period, the staggering of the blind giant may make it appear as though a mighty power was being placed in his hands, but it is not so. An improved method for determining the value of labor is simply being evolved, and when the evolution is completed there will be less occasion for trade-unionism, strikes, or arbitration.